



BECOMING LESS VULNERABLE TO DISASTER

TOE RIVER

REGIONAL HAZARD MITIGATION PLAN

Covers Avery, McDowell,
Mitchell and Yancey Counties

PBSJ
an Atkins company

March 2011



U.S. Department of Homeland Security
FEMA Region IV
3003 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

May 24, 2011

Mr. Chris Crew
State Hazard Mitigation Officer
North Carolina Division of Emergency Management
4713 Mail Service Center
Raleigh, North Carolina 27699

Reference: Toe River Regional Hazard Mitigation Plan

Dear Mr. Crew:

This is a follow-up to our previous correspondence of May 19, 2011, in which we approved the Toe River Regional Local Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolutions for inclusion within this plan and subsequently have approved the communities under the approved Toe River Regional Local Hazard Mitigation Plan:

- Avery County, Uninc.
- Town of Banner Elk
- Town of Crossnore
- Town of Elk Park
- Grandfather Village
- Village of Sugar Mountain
- Town of Newland
- McDowell County, Uninc.
- City of Marion
- Town of Old Fort
- Mitchell County, Uninc.
- Town of Bakersville
- Town of Spruce Pine

The approved participating communities are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Severe Repetitive Loss (SRL)
- Flood Mitigation Assistance (FMA)

A fifth program, Repetitive Flood Claims (RFC), does not have a requirement for a local Hazard Mitigation Plan. National Flood Insurance Program (NFIP) participation is required for some programs.

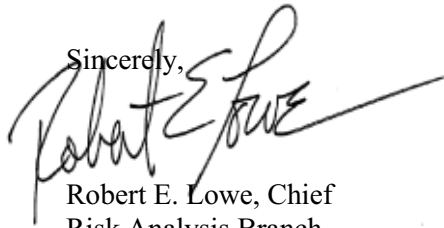
We commend Toe River Regional for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs. In addition, please be aware that if any of the approved jurisdictions participating in this plan are placed on probation or are suspended from the National Flood Insurance Program, they may be ineligible for certain types of federal funding.

We strongly encourage each community to perform an annual review and assessment of the effectiveness of their hazard mitigation plan; however, a formal plan update is required at least every five (5) years. We also encourage each community to conduct a plan update process within one year of being included within a Presidential Disaster Declaration or of the adoption of major modifications to their local Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development.

When the Plan is amended or revised, it must be resubmitted through the State as a "plan update" and is subject to a formal review and approval process by our office. If the Plan is not updated prior to the required five (5) year update, please ensure that the Draft update is submitted at least six (6) months prior to expiration of this plan approval.

If you or Toe River Regional have any further questions or need any additional information please do not hesitate to contact Victor Geer, of the Hazard Mitigation Assistance Branch, at (770) 220-5659, or Linda L. Byers of my staff at (770) 220-5498.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert E. Lowe", with a long horizontal flourish extending to the right.

Robert E. Lowe, Chief
Risk Analysis Branch
Mitigation Division

TABLE OF CONTENTS

Introduction.....	SECTION 1
Planning Process.....	SECTION 2
Community Profile.....	SECTION 3
Hazard Identification.....	SECTION 4
Hazard Profiles.....	SECTION 5
Vulnerability Assessment.....	SECTION 6
Capability Assessment.....	SECTION 7
Mitigation Strategy.....	SECTION 8
Mitigation Action Plan.....	SECTION 9
Plan Maintenance.....	SECTION 10
Plan Adoption.....	APPENDIX A
Planning Tools.....	APPENDIX B
Local Mitigation Plan Crosswalk.....	APPENDIX C
Planning Process Documentation.....	APPENDIX D

SECTION 1

INTRODUCTION

This section provides a general introduction to the Toe River Regional Hazard Mitigation Plan. It consists of the following five subsections:

- 1.1 Background
- 1.2 Purpose
- 1.3 Scope
- 1.4 Authority
- 1.5 Summary of Plan Contents

1.1 BACKGROUND

Natural hazards, such as hurricanes, floods, and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety and property.

The Toe River Region is located in the western part of North Carolina and includes the counties of Avery, McDowell, Mitchell, and Yancey. This area is vulnerable to a wide range of natural hazards such as landslides, winter storms, severe thunderstorms, and wildfires. It is also vulnerable to human-caused hazards, including chemical releases, hazardous material spills, and acts of terrorism. These hazards threaten the life and safety of residents in the Toe River Region, and have the potential to damage or destroy both public and private property, disrupt the local economy and impact the overall quality of life of individuals who live, work, and vacation in the Toe River Region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.



FEMA Definition of Hazard Mitigation:

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural

measures (such as the adoption of sound land use policies and the creation of public awareness programs). It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation a comprehensive approach to hazard mitigation is to develop, adopt, and update as needed a local hazard mitigation plan. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

Each of the four counties participating in the development of this Toe River Regional Hazard Mitigation Plan has an existing hazard mitigation plan that has evolved over the years, as described in Section 2: Planning Process. This regional plan draws from each of the County plans and documents the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the Toe River Region's vulnerability to identified hazards. The plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Act

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities, and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

Additionally, the Flood Insurance Reform Act of 2004 (P.L. 108-264) created two new grant programs: Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs.

The Toe River Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCDEM) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. *A Local Mitigation Plan Crosswalk,*

found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the Toe River Regional Hazard Mitigation Plan is to:

- Merge the existing Avery, McDowell, Mitchell, and Yancey County hazard mitigation plans into one regional plan;
- Complete update of existing plans to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions;
- Update plans in accordance with Community Rating System (CRS) requirements; and
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the Toe River Regional Hazard Mitigation Plan is on those hazards determined to be “high” or “moderate” risks to the Toe River Region, as determined through a detailed hazard risk assessment. Other hazards that pose a “low” or “negligible” risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables the participating counties to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes the Counties of Avery, McDowell, Mitchell, and Yancey, as well as their incorporated jurisdictions. **Table 1.1** lists each of these counties and their participating jurisdictions.

TABLE 1.1: PARTICIPATING AREAS IN THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

Avery County	
Banner Elk	Grandfather Village
Crossnore	Sugar Mountain
Elk Park	Newland
McDowell County	
Marion	Old Fort
Mitchell County	
Bakersville	Spruce Pine
Yancey County	
Burnsville	

1.4 AUTHORITY

The Toe River Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans, and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201; and,
- Flood Insurance Reform Act of 2004 (P.L. 108-264).

1.5 SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plan).

Section 2: **Planning Process**, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the planning team, and how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held, along with any associated outcomes.

The **Community Profile**, located in Section 3, provides a general overview of the Toe River Region, including prevalent geographic, demographic and economic characteristics. In addition, building characteristics and land use patterns are discussed. This baseline information provides a snapshot of the planning area and helps local officials recognize those social, environmental and economic factors that ultimately play a role in determining the region's vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4: **Hazard Identification**; Section 5: **Hazard Profiles**; and Section 6: **Vulnerability Assessment**. Together, these sections serve to identify, analyze and assess hazards that pose a threat to the Toe River Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the Toe River Region.

The Risk Assessment begins by identifying hazards that threaten the Toe River Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, FEMA's HAZUS^{®MH} loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the Toe River Region seeks to determine the most appropriate mitigation actions to pursue

and implement—enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The **Capability Assessment**, found in Section 7, provides a comprehensive examination of the Toe River Region’s capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of detailed survey questionnaires for local officials and an inventory and analysis of existing plans, ordinances and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses or conflicts in programs or activities that may hinder mitigation efforts, and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Community Profile*, *Risk Assessment*, and *Capability Assessment* collectively serve as a basis for determining the goals for the Toe River Regional Hazard Mitigation Plan, each contributing to the development, adoption and implementation of a meaningful and manageable *Mitigation Strategy* that is based on accurate background information.

The **Mitigation Strategy**, found in Section 8, consists of broad goal statements as well as an analysis of hazard mitigation techniques for the Toe River Region to consider in reducing hazard vulnerabilities. The strategy provides the foundation for a detailed **Mitigation Action Plan**, found in Section 9, which links specific mitigation actions for each county department or agency to locally-assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make the Toe River Region less vulnerable to the damaging forces of hazards while improving the economic, social and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety.

Plan Maintenance Procedures, found in Section 10, includes the measures that the Toe River Region will take to ensure the Plan’s continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

SECTION 2

PLANNING PROCESS

44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

This section describes the planning process undertaken by the Toe River Region in the development of its 2010 Regional Hazard Mitigation Plan. It consists of the following seven subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the Toe River Region
- 2.3 Preparing the 2010 Plan
- 2.4 The Toe River Regional Hazard Mitigation Planning Committee (TRRHMP)
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department or agency along with a schedule or target completion date for its implementation (see Section 10: *Plan Maintenance*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the plan remains a current, dynamic and effective planning document over time that becomes integrated into the routine local decision making process.

Communities that participate in hazard mitigation planning have the potential to accomplish many benefits, including:

- saving lives and property
- saving money
- speeding recovery following disasters

- reducing future vulnerability through wise development and post-disaster recovery and reconstruction
- expediting the receipt of pre-disaster and post-disaster grant funding
- demonstrating a firm commitment to improving community health and safety

Typically, mitigation planning is described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery and reconstruction. Furthermore, mitigation practices will enable local residents, businesses and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE TOE RIVER REGION

Each of the four counties and jurisdictions participating in this Plan has a previously adopted hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- *Avery County Multi-Jurisdictional Hazard Mitigation Plan* (July 2005)
 - Town of Banner Elk
 - Town of Crossnore
 - Town of Elk Park
 - Town of Newland
 - Village of Sugar Mountain
 - Grandfather Village
- *McDowell County Multi-Jurisdictional Hazard Mitigation Plan* (September 2006)
 - City of Marion
 - Town of Old Fort
- *Mitchell County Multi-Jurisdictional Hazard Mitigation Plan* (April 2005)
 - Town of Bakersville
 - Town of Spruce Pine
- *Yancey County Multi-Jurisdictional Hazard Mitigation Plan* (April 2005)
 - Town of Burnsville

Each of these plans was developed using the multi-jurisdictional planning process recommended by the Federal Emergency Management Agency (FEMA). For this plan, all of the aforementioned jurisdictions have joined to form a regional plan, making it a unique situation. No new jurisdictions have joined the process and all of the jurisdictions that previously participated in previous planning efforts have

participated in the development of this regional plan. The process of merging all of the above plans into this regional plan is described in more detail below.

2.3 PREPARING THE 2010 PLAN

Hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation and public assistance funding. To simplify planning efforts for the jurisdictions in the Toe River Region, Avery, McDowell, Mitchell and Yancey Counties decided to join together to create the Toe River Regional Hazard Mitigation Plan. This allows resources to be shared amongst the participating jurisdiction and eases the administrative duties of all of the participants by combining the four existing County-level plans into one multi-jurisdictional plan.

To prepare the 2010 *Toe River Regional Hazard Mitigation Plan*, the Toe River Region hired PBS&J as an outside consultant to provide professional mitigation planning services. To meet requirements of the Community Rating System, the region ensured that the planning process was facilitated under the direction of a professional planner. Nathan Slaughter from PBS&J served as the lead planner for this project and is a member of the American Institute of Certified Planners (AICP).

Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386) and recommendations provided by North Carolina Division of Emergency Management (NCEM) mitigation planning staff¹. The Local Mitigation Plan Crosswalk, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Interim Final Rule as published in the Federal Register on February 26, 2002 in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Multi-Hazard Mitigation Planning Guidance (last revised in July 2008) for reference as they completed the Plan.

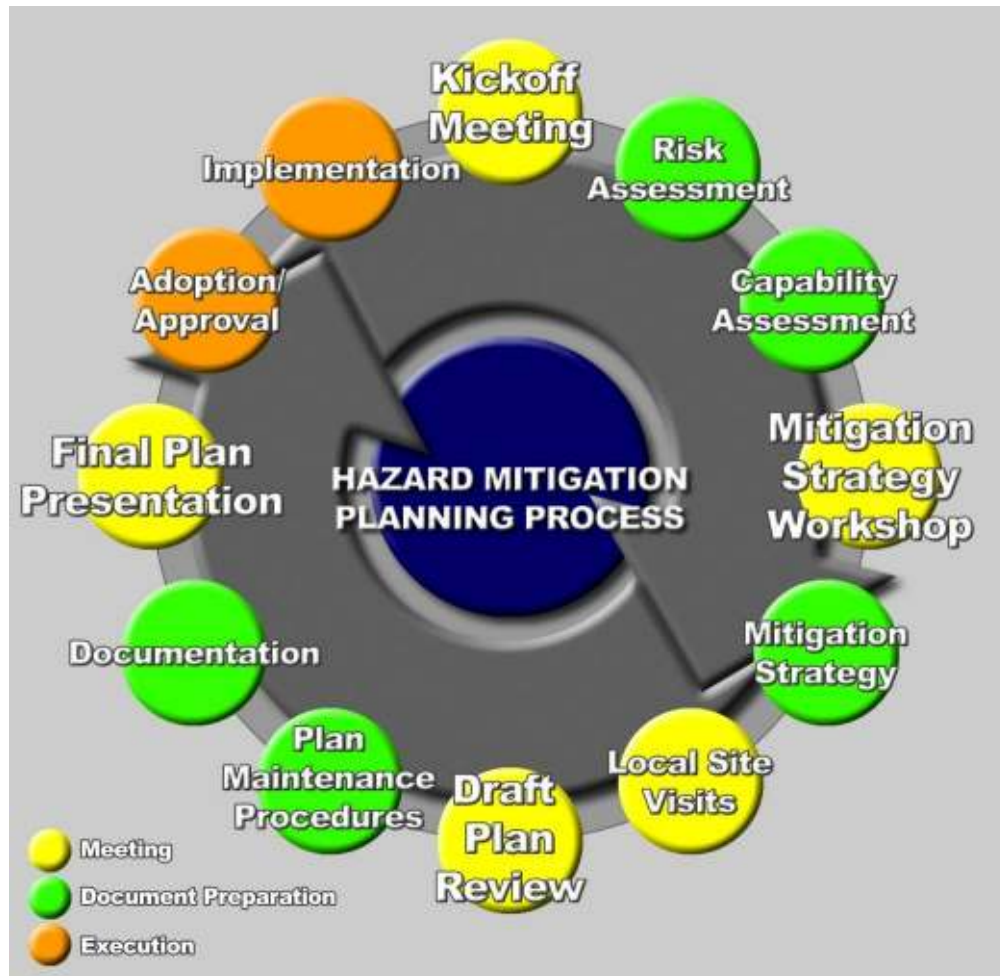
Although each participating jurisdiction had already developed a plan in the past, the combination of the four plans into one regional plan still required making some plan update revisions based on FEMA's Local Multi-Hazard Mitigation Planning Guidance. Since all sections of the regional plan are technically new, plan update requirements do not apply. However, since this is the first regional plan among the jurisdictions, key elements from the previous approved plans are referenced throughout the document (e.g., existing actions) and required a discussion of changes made. For example, all of the risk assessment elements needed to be updated to include most recent information. It was also necessary to formulate a single set of goals for the region, but they were based on previously determined goals (Section 8: *Mitigation Strategy*). The Capability Assessment section includes updated information for all of the participating jurisdictions and the Mitigation Action Plan provides implementation status updates for all of the actions identified in the previous plans.

The process used to prepare this Plan included twelve (12) major steps that were completed over the course of approximately nine months beginning in October 2009. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

¹ A copy of the negotiated contractual scope of work between the participating counties and PBS&J is available through the Mitchell County upon request.

Over the past five years, each participating jurisdiction has been actively working to implement their existing plans. This is documented in the Mitigation Action plan through the implementation status updates for each of the Mitigation Actions. The Capability Assessment also documents changes and improvements in the capabilities of each participating jurisdiction to implement the Mitigation Strategy.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE TOE RIVER REGION



2.4 THE TOE RIVER REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

In order to guide the development of this Plan, the Toe River counties (Avery County, McDowell County, Mitchell County, and Yancey County) created the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP or TRRHMP Planning Committee). The TRRHMP represents a community-based planning team made up of representatives from various county departments and municipalities and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in October 2009, the TRRHMP members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

Specifically, the tasks assigned to the TRRHMP members included:

- participate in TRRHMP meetings and workshops
- provide best available data as required for the risk assessment portion of the Plan
- help complete the local Capability Assessment Survey and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- support the development of the Mitigation Strategy, including the design and adoption of community goal statements
- help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- review and provide timely comments on all study findings and draft plan deliverables
- support the adoption of the 2010 *Toe River Regional Hazard Mitigation Plan*

Table 2.1 lists the members of the TRRHMP who were responsible for participating in the development of the Plan. Committee members are listed in alphabetical order by last name.

**TABLE 2.1: MEMBERS OF THE TOE RIVER REGIONAL
HAZARD MITIGATION PLANNING COMMITTEE**

NAME	DEPARTMENT / AGENCY
Bennett, Nathan	Yancey County Manager
Buchanan, Brian	Town of Burnsville Police Department
Burleson, Tommy	Avery County Planning and Inspections
Canipe, Richard	Town of Spruce Pine Manager
Davis, Bill	Yancey County Emergency Management
Godwin, Deborah	McDowell County Tax Office
Harmon, Ronald	McDowell County Planning Administrator
McCurry, Isaac	Town of Burnsville Fire Department
Neal, Jim	City of Marion Fire Department
Parsley, Mavis	Mitchell County Finance
Ramsey, Tiawana	NC Division of Emergency Management
Seaberg, James	Avery County GIS
Vance, David	Avery County Emergency Management
Vines, Charles	Mitchell County Manager
Wiseman, Eric	Mitchell County Emergency Management
Young, Terry	McDowell County Emergency Management

Additional participation and input from other identified stakeholders and the general public was sought by the Toe River counties during the planning process through phone calls and the distribution of e-mails, advertisements and public notices aimed at informing people on the status of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed later in this section).

2.4.1 Multi-Jurisdictional Participation

The Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan includes four counties and eleven incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were required to perform the following tasks:

- Participate in mitigation planning workshops;
- Complete the *Local Capability Assessment Survey*;
- Identify completed mitigation projects, if applicable; and
- Develop and adopt (or update) their local Mitigation Action Plan

Each jurisdiction participated in the planning process and have developed local Mitigation Action Plans unique to their jurisdiction. Each jurisdiction will adopt their Mitigation Action Plan separately. This provides the means for jurisdictions to monitor and update their Plan on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus and initiating data collection efforts with local government staff, community officials and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. The following is a summary of the key meetings and community workshops held during the development of the plan update.² In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.

October 29, 2009

Project Kickoff Meeting

Immediately following the contractual Notice to Proceed, PBS&J staff arranged for a project kickoff meeting. Eric Wiseman, Mitchell County's Emergency Management Director and the point of contact for the project, sent an email inviting representatives from the participating counties and municipalities, NCEM, and other local organizations to the meeting.

Tiawana Ramsey, North Carolina Emergency Management Area 12 Coordinator, began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting. She then introduced PBS&J and turned the meeting over to Nathan Slaughter, PBS&J's Lead Planner for the project.

Mr. Slaughter led the kickoff meeting and began by having attendees introduce themselves. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, project description, and presentation slides). He then defined mitigation and gave an overview of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

² Copies of the agendas, sign-in sheets, minutes and handout materials for all meetings and workshops can be found in Appendix B.

Mr. Slaughter explained the six different categories of mitigation techniques (emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection) and gave examples of each. He discussed the key objectives of the planning process and gave a list of the participating jurisdictions for the regional plan. Mr. Slaughter then explained the mitigation planning process and specific tasks to be accomplished for this project, including the risk assessment, capability assessment, mitigation strategy, mitigation action plan and plan maintenance procedures.

The project schedule was presented along with the project staffing chart, which demonstrates the number of experienced individuals that will be working on this project. Mr. Slaughter then reviewed the roles and responsibilities of PBS&J, the county leads, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development, which included determining the members of the TRRHMP and scheduling the first planning team meeting.

November 19, 2009 First TRRHMP Meeting

Following the project kickoff meeting, PBS&J staff arranged for the first meeting of the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP). Eric Wiseman, Mitchell County's Emergency Management Director and the point of contact for the project, sent an email inviting the TRRHMP members to the meeting.

Tiawana Ramsey, the Area Coordinator from North Carolina Emergency Management, began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting. She then introduced PBS&J and turned the meeting over to Nathan Slaughter, the Project Manager from PBS&J.



November 12, 2009 TRRHMP Meeting

Mr. Slaughter led the meeting of the TRRHMP and began by having attendees introduce themselves. The 15 attendees included representatives from various departments and local jurisdictions within each of the four counties participating in the plan update. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, project description, presentation slides, GIS data inventory, Capability Assessment Survey, Public Participation Survey, and existing mitigation actions). He then defined mitigation and gave an overview of the Disaster Mitigation Act of 2000 and NC Senate Bill 300. It was noted that Mitchell County has received Public

Assistance for two previous state-declared disasters.

Following the overview, Mr. Slaughter led the group in an “icebreaker” exercise to introduce meeting participants to various mitigation techniques. He briefly explained the six different categories of mitigation techniques: emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection. Each attendee was then given \$20 in mock currency and asked to “spend” their mitigation money as they personally deemed appropriate among the six mitigation categories. Money was “spent” by placing it in cups labeled with each of the mitigation techniques. Upon completion of the exercise, Mr. Slaughter stated that the results would be tabulated and shared with the group at the next meeting.

Following the icebreaker exercise, Mr. Slaughter reviewed the key objectives of the project which are to:

- Merge the four County plans into one regional plan
- Complete update of existing plans to demonstrate progress and reflect current conditions
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Maintain compliance with State and Federal requirements

Mr. Slaughter discussed the expiration dates for each County’s existing plan and went through a list of the participating jurisdictions. Mr. Slaughter then explained the mitigation planning process and specific tasks to be accomplished for this project, including the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan and plan maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point person to coordinate the gathering of GIS data required for the analysis. The project schedule was presented and Mr. Slaughter noted that the nine-month schedule provided ample time to produce a quality plan and meet state and federal deadlines.

The project staffing chart was presented to demonstrate the number of experienced individuals that will be working on this project. Mr. Slaughter then reviewed the roles and responsibilities of PBS&J, the County leads, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development. Mr. Slaughter requested that each participating department complete a Capability Assessment Survey and return it. He explained that results of the survey would be presented and discussed at the next meeting. He also encouraged meeting participants to distribute the Public Participation Survey. The next HMPT meeting was scheduled for February 18, 2010 to discuss the findings of the risk and capability assessments and begin proposing mitigation actions. Mr. Slaughter asked each County to review their existing mitigation actions in preparation for the next meeting.

February 18, 2010

Second TRRHMP Meeting

Tiawana Ramsey, the Area 12 Coordinator from North Carolina Emergency Management, began the meeting by welcoming the attendees and introducing the consultant team from PBS&J. Nathan Slaughter from PBS&J facilitated the remainder of the meeting.

Mr. Slaughter began with a review of the meeting handouts, which included an agenda, proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for new mitigation actions. Mr. Slaughter reviewed the project schedule and stated that a draft of the Hazard Mitigation Plan would be presented to the TRRHMP in April. The next TRRHMP meeting would be scheduled for May.

He then gave the results of the icebreaker exercise from the first TRRHMP meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

■ Emergency Services	\$84
■ Prevention	\$65
■ Natural Resource Protection	\$42
■ Property Protection	\$36
■ Structural Projects	\$32
■ Public Education	\$21

Caroline Cunningham with PBS&J then presented the findings of the risk assessment. She reviewed the process for preparing Hazard Profiles. She explained how each hazard falls into one of four basic categories: Atmospheric, Hydrologic, Geologic, and Other, and each must be evaluated and formally ruled out if it is not applicable to the study area, even where it seems obvious (such as in the case of volcano).

Ms. Cunningham reviewed the Hazard Profiles and the following bullets summarize the information presented:

- DROUGHT. There were nine events recorded in the Toe River Region between 2000 and 2009 and future occurrences are likely.
- HAILSTORM. There have been 120 recorded events since 1958. Future occurrences are likely.
- HURRICANE REMNANTS. NOAA data shows that 32 storm tracks have come within 75 miles of the Toe River Region since 1850. Two of those storms were hurricanes, eleven were tropical storms, and nineteen were tropical depressions. Future occurrences are likely.
- SEVERE THUNDERSTORM WINDS. There have been 223 severe thunderstorm events since 1994 with \$7.4 million in reported property damages. Future occurrences are likely.
- LIGHTNING. There have been ten recorded lightning events since 1993, causing one death, fourteen injuries, and \$292,000 in reported property damages. Future occurrences are likely.
- TORNADOES. There have been six recorded tornado events in the Toe River Region since 1979. \$1.8 million in property damages and 1 death and 1 injury have been reported. Future occurrences are likely.
- WINTER STORM. There have been 626 recorded winter events in the Toe River Region since 1993 resulting in \$39 million in reported property damages and two deaths. Future occurrences are certain.

- EARTHQUAKES. There have been 44 recorded earthquake events in the Toe River Region since 1874. The strongest had a recorded magnitude of 5.4 on the Richter scale. Future occurrences are likely.
- LANDSLIDE. There have been 172 recorded landslide events in the Toe River Region. However, there are no reports of injuries or property damages. Ms. Cunningham asked the TRRHMP to provide local information on landslide events, if available. Future occurrences are likely.
- DAM FAILURE. There are 77 dams in the Toe River Region, 40 of which are classified as high hazard dams. There have been eleven reported breaches and future occurrences are likely.
- EROSION. Erosion was included in the previous Avery County and Yancey County plans. Several areas of concern were noted in Avery County, but none were noted in Yancey County.
- FLOOD. There have been 56 flood events recorded in the Toe River Region since 1993, resulting in \$81.1 million in property damage. There have been 236 NFIP losses since 1978 and approximately \$4.6 million in claims. Eighteen repetitive loss properties in the region account for 44 of the recorded losses. Future occurrences are likely.
- WILDFIRE. There have been 5,027 total fires reported in the Toe River Region between 1970 and 2008. Ms. Cunningham asked the TRRHMP to provide any local information on wildfire events.
- HAZARDOUS MATERIALS INCIDENTS. Ms. Cunningham asked the TRRHMP to provide any local information and stated that the vulnerability assessment still needed to be completed. TRRHMP provided information about various areas of concern regarding hazardous materials facilities. This information was incorporated into the Risk Assessment sections of the plan.
- TERROR THREATS. There have been no reported terrorism events in the Toe River Region. The TRRHMP stated that the Baxter Healthcare facility in Marion should be listed as a possible target for a terror threat.

In concluding the review of Hazard Profiles, Ms. Cunningham stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email her with their concerns.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storms and Freeze, followed by Severe Thunderstorm and Flood.

Jenny Noonkester with PBS&J presented the Capability Assessment Findings. PBS&J has developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, Community Rating System (CRS) participation, and the Local Capability Assessment Survey conducted by PBS&J.

Ms. Noonkester reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the moderate to high range for Planning and Regulatory Capability and in the low to moderate range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and grant writers. Based upon the scoring methodology developed by PBS&J, it was determined that all of the participating jurisdictions have moderate or high capabilities to implement hazard mitigation programs and activities.

Ms. Noonkester also discussed the results of the public participation survey that was posted on several of the participating counties' websites. As of the meeting date, 50 responses had been received. Based on preliminary survey results, respondents felt that severe thunderstorms posed the greatest threat to their neighborhood, followed by flood and wildfire. Nearly all respondents were interested in making their homes more resistant to hazards. However, 75 percent of them don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the four existing county plans. The TRRHMP accepted the proposed goals for the regional plan. Mr. Slaughter then asked each county to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by March 13, 2010. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by March 13, 2010.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

2.6 INVOLVING THE PUBLIC

44 CFR Requirement

44 CFR Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

An important component of the mitigation planning process involved public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community “buy-in” from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community’s overall mitigation strategy aimed at making a home, neighborhood, school, business or entire city safer from the potential effects of hazards.

Public involvement in the development of the *Toe River Regional Hazard Mitigation Plan* was sought using three methods: (1) open public meetings; (2) survey instruments; and (3) making copies of draft Plan deliverables available for public review on county websites and at government offices. Public meetings were held at two distinct periods during the planning process: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption. These public meetings were held at various locations throughout the planning area to ensure that citizens in each of the four participating counties were afforded an opportunity to participate in the planning process. A public participation survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout the Toe River counties and on each county’s website.

The two rounds of open public meetings that were held during the development of this Plan are described below.

February 18, 2010

First Round of Public Meetings

The first round of open public meeting was held in the evening following the second TRRHMP meeting on February 18, 2010. The meetings were advertised through a notice in the following local newspapers:

- McDowell News
- News Bulletin of McDowell County
- Mitchell News Journal
- Avery Post
- Yancey Common Times Journal

The purpose of the public meetings was to describe the purpose of the hazard mitigation plan, explain the categories of mitigation actions, and give the public an opportunity to participate in the planning process. A public meeting was held in each of the four participating counties to give citizens from all participating jurisdictions an opportunity to participate. Meetings were held at the following locations:

- Avery County: Commissioners Board Room (Room 116) in the Avery County Offices Complex at 175 Linville Street in Newland, 6:00 to 7:00 pm
- McDowell County: Commissioners Board Room in the McDowell County Administration Building at 60 East Court Street in Marion, 6:00 to 7:00 pm
- Mitchell County: Commissioners Conference Room in the Mitchell County Administration Building, 5:30 to 6:30 pm
- Yancey County: Commissioners Board Room in the Yancey County Courthouse in Burnsville, 6:00 to 7:00 pm

Two members of the public signed in at the Yancey County meeting and one person signed in at the Mitchell County meeting. No members of the public attended the Avery County or McDowell County meetings. The comments received from the three members of the public were in reference to local areas of concern (a volunteer fire station that floods, and an area of localized flooding). Local and County officials that attended these meetings made note of these concerns and considered these issues in the development of their mitigation strategy.

Second Round of Public Meetings

Each of the participating jurisdictions will held public meetings before the final plan was officially adopted by the local governing bodies. These meetings occurred at different times once FEMA granted conditional approval of the plan. Adoption resolutions have been included in **Appendix A**.

2.6.1 Public Participation Survey

Although the open public meetings failed to draw large attendance, the Toe River Region was successful in getting citizens to provide input to the mitigation planning process through the use of the *Public Participation Survey*. The Public Participation Survey was designed to capture data and information from residents of the Toe River Region that might not be able to attend public meetings or participate through other means in the mitigation planning process.

Copies of the *Public Participation Survey* were distributed to the TRRHMP to be made available for residents to complete at local public offices. An electronic version of the survey was also posted on each county's website. A total of 66 survey responses were received, which provided valuable input for the TRRHMP to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 62 percent of survey respondents had been impacted by a disaster, mainly flooding (flood of 1977) and winter storms (blizzard of 1993).
- Respondents ranked Severe Thunderstorm as the highest threat to their neighborhood (32 percent), followed by Flood (26 percent) and Wildfire (15 percent).

- Approximately 41 percent of respondents have taken actions to make their homes more resistant to hazards and 94 percent are interested in making their homes more resistant to hazards.
- 75 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Prevention, Emergency Services, and Public Education were ranked as the most important activities for communities to pursue in reducing risks.

A copy of the survey and a detailed summary of the survey results are provided in Appendix B.

2.7 INVOLVING THE STAKEHOLDERS

44 CFR Requirement

44 CFR Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other non-profit interests to be involved in the planning process.

In addition to the TRRHMP meetings, the Toe River Region encouraged more open and widespread participation in the mitigation planning process through the design and posting of public notices and newspaper advertisements that promoted the open public meetings (described earlier in this Section). The region also went above and beyond in its local outreach efforts through the design and distribution of the *Public Participation Survey*. These media advertisements and survey instruments provided opportunities for local officials, residents, businesses, academia and other private interests in the Toe River Region to be involved and offer input throughout the local mitigation planning process.

Despite these outreach efforts, no additional stakeholders participated on the TRRHMP other than those participants listed in Section 2.4. No stakeholders attended the public meetings discussed in Section 2.6. Submissions of the public survey mentioned in section 2.6.1 were anonymous, so it is not possible to tell what, if any, stakeholders submitted hard copy or internet-based surveys.

2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the Toe River Region is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating Counties with the development of the initial Hazard Mitigation Plans in the early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to natural hazards for the people and property in the Toe River Region. The actions that have been completed are documented in the Mitigation Action Plan found in Section 8.

In addition, community capability continues to improve with the implementation of new plans, policies and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 7: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard

mitigation planning and have proven this by reconvening the Hazard Mitigation Planning Team to update the plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3

COMMUNITY PROFILE

This section of the Plan provides a general overview of the Toe River Region. It consists of the following four subsections:

- 3.1 Geography and the Environment
- 3.2 Population and Demographics
- 3.3 Housing, Infrastructure and Land Use
- 3.4 Employment and Industry

3.1 GEOGRAPHY AND THE ENVIRONMENT

The Toe River Region is a rural area located within the Appalachian Mountains of western North Carolina, along the Tennessee border. For the purposes of this plan, the Toe River Region includes the counties of Avery, McDowell, Mitchell, and Yancey. An orientation map is provided as **Figure 3.1**.

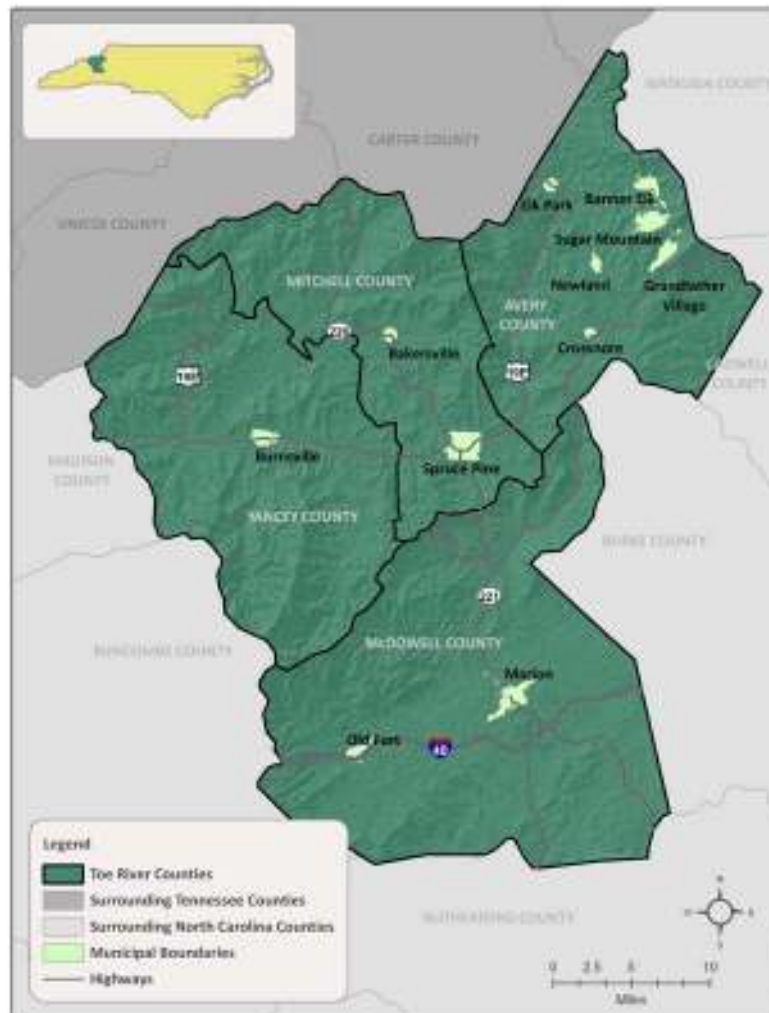
The region is a popular tourist destination for a variety of outdoor activities, including hiking, rafting, kayaking, fishing, bird watching, and snow skiing. Mt. Mitchell, the highest point in the eastern United States at 6,684 feet above sea level, is located in Yancey County. Most of Grandfather Mountain, a popular tourist destination, is located within Avery County and approximately half of Avery County is located within the Pisgah National Forest. The total land area of each of the participating counties is presented in **Table 3.1**.

TABLE 3.1: TOTAL AREAS OF PARTICIPATING COUNTIES

County	Total Land Area
Avery County	247 square miles
McDowell County	442 square miles
Mitchell County	221 square miles
Yancey County	312 square miles

Source: US Census Bureau

The Toe River Region enjoys four distinct seasons and the climate in the Region is cooler than most other mountain communities due to its elevation. In the summer, average high temperatures (°F) are in the mid-seventies while average low temperatures are in the mid-fifties. In the winter, average high temperatures reach the low forties while average low temperatures are in the low twenties.

FIGURE 3.1: TOE RIVER REGION ORIENTATION MAP

3.2 POPULATION AND DEMOGRAPHICS

McDowell County is the largest participating county and also has the largest population. Several participating jurisdictions experienced a decrease in population between 2000 and 2010. The City of Marion experienced the largest increase in population of any participating jurisdiction between 2000 and 2010 with a nearly 59 percent increase. Population counts from the US Census Bureau for 1990, 2000, and 2010 for each of the participating counties and jurisdictions are presented in Table 3.2.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
AVERY COUNTY	14,867	17,167	17,797	3.7%
Town of Banner Elk	933	811	1,028	26.8%
Town of Crossnore	271	242	192	-20.7%
Town of Elk Park	486	459	452	-1.5%
Town of Newland	645	704	698	-0.9%
Village of Sugar Mountain	132	226	198	-12.4%
Grandfather Village	34	73	25	-65.8%
MCDOWELL COUNTY	35,681	42,151	44,996	6.7%
City of Marion	4,765	4,943	7,838	58.6%
Town of Old Fort	720	963	908	-5.7%
MITCHELL COUNTY	14,433	15,687	15,579	-0.7%
Town of Bakersville	332	357	464	30%
Town of Spruce Pine	2,010	2,030	2,175	7.1%
YANCEY COUNTY	15,419	17,774	17,818	0.2%
Town of Burnsville	1,482	1,623	1,693	4.3%

Source: US Census Bureau

Based on the 2000 Census, the median age for residents of the participating counties ranges from 38 to 42 years. The racial characteristics of the participating counties are presented in **Table 3.3**. Generally, whites make up the vast majority of the population of the region, accounting for over 93 percent of each county's population.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White Persons, Percent (2008)	Black Persons, Percent (2008)	Other Race, Percent (2008)	Persons of Hispanic Origin, Percent (2008)*
AVERY COUNTY	93.4%	5.2%	0.7%	3.9%
MCDOWELL COUNTY	93.7%	4.0%	1.4%	4.6%
MITCHELL COUNTY	97.7%	0.7%	0.7%	3.6%
YANCEY COUNTY	97.8%	1.0%	0.6%	5.4%

Source: US Census Bureau

*Hispanics may be of any race, so also are included in applicable race categories

3.3 HOUSING, INFRASTRUCTURE AND LAND USE

3.3.1 Housing

According to the US Census Bureau's 2008 Housing Unit Estimates, there are 52,527 housing units in the Toe River Region, most of which are single family homes. Housing information for the four participating counties is presented in **Table 3.4**. As shown in the table, Avery County has a high percentage of seasonal housing units compared to the other counties.

TABLE 3.4: HOUSING CHARACTERISTICS

Jurisdiction	Housing Units (2000)	Housing Units (2008)	Seasonal Units, Percent (2000)	Median Home Value (2000)
AVERY COUNTY	11,911	13,718	39.9%	\$88,000
MCDOWELL COUNTY	18,377	19,871	3.1%	\$72,000
MITCHELL COUNTY	7,919	8,340	6.0%	\$78,800
YANCEY COUNTY	9,729	10,598	12.6%	\$93,000

Source: US Census Bureau

3.3.2 Infrastructure

Transportation

There are several major highways that traverse the Toe River Region. Interstate 40 runs generally east-west through McDowell County just south of Marion and connects Asheville to the west with Hickory to the east. Interstate 26 runs generally north-south along the western edge of Yancey County, connecting Asheville, NC to the south with Johnson City, TN to the north. NC Highway 226 connects Marion to Spruce Pine in Avery County. US Highway 19E runs north-south through Avery County to Spruce Pine and then east through Mitchell and Yancey Counties to Interstate 26. In addition, the Blue Ridge Parkway runs along through the southern portion of Avery County, along the border between Mitchell and McDowell Counties, and through the southern portion of Yancey County.

There are several small airports within the Toe River Region, including the Avery County Airport (Morrison Field) in Spruce Pine and the Marion Airport (Shiflet Field) in Marion. The nearest major airport to the region is the Asheville Regional Airport, which offers non-stop commercial flights to destinations across the eastern US and is located approximately 40 miles from the center of the Toe River Region.

Utilities

Electric power in the Toe River Region is provided by several electricity cooperatives. Rutherford Electric Membership Corporation serves the eastern half of McDowell County. The French Broad Electric Membership Corporation serves Yancey County and Mitchell County. Avery County is served by the Mountain Electric Cooperative.

Water and sewer service is provided by many of the towns in the Toe River Region, but unincorporated areas rely on septic systems and wells. The Towns of Newland, Burnsville, Old Fort, Spruce Pine, and Bakersville, along with the City of Marion, provide water and sewer service. In Yancey County, there are plans for the East Yancey Water and Sewer Project to build a new sewer system and treatment plant east of Burnsville. Construction is scheduled to begin in 2010.

Community Facilities

There are a number of public buildings and community facilities located throughout the Toe River Region. According to the data collected for the vulnerability assessment (**Section 6.3.3**), there are 47 fire stations, 19 police stations, eight libraries, and 40 public schools located within the study area.

Three hospitals are located in the Toe River Region. The largest is the McDowell Hospital, a 65-bed facility in Marion. Blue Ridge Regional Hospital is a 46-bed facility located in Spruce Pine. Cannon Memorial Hospital is located in Linville in Avery County and has 25 beds.

The Toe River Region contains numerous local, state, and national parks and recreation areas, including Pisgah National Forest, Grandfather Mountain, Linville Gorge, and Mt. Mitchell. These facilities offer recreational opportunities to area residents and hundreds of thousands of visitors each year.

3.3.3 Land Use

Many areas of the Toe River Region are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in state and national parks. As shown in **Figure 3.1** above, there are a few small incorporated municipalities located throughout the study area, and these areas are where the region's population is generally concentrated. The incorporated areas are where many of the study area's businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, and recreational areas.

3.4 EMPLOYMENT AND INDUSTRY

In 2008, Avery County had an average annual employment of 8,338 workers. According to the North Carolina Employment Security Commission (NCESC), the Education and Health Services industry employed 33.8 percent of the workforce, followed by Leisure and Hospitality (15.2%) and Trade, Transportation, and Utilities (14.8%). The median household income in Avery County in 2007 was \$36,068, compared to \$44,772 for North Carolina.

In 2008, McDowell County had an average annual employment of 15,995 workers. According to the NCESC, the Manufacturing industry employed the most people with 37.5 percent of the county's workforce, followed by Education and Health Services (19 %) and Trade, Transportation, and Utilities (13.7%). The median household income in McDowell County in 2007 was \$36,384.

Mitchell County had an average annual employment of 5,355 workers in 2008. According to the NCESC, the Education and Health Services industry employed 31.5 percent of the workforce, followed by Trade, Transportation, and Utilities (20.4%) and Public Utilities (9.4%). The median household income in Mitchell County in 2007 was \$36,239.

In 2008, Yancey County had an average annual employment of 4,012 workers. According to the NCESC, the Trade, Transportation, and Utilities industry employed 22.6 percent of the workforce, followed closely by Education and Health Services with 22.5 percent of the workforce. Construction was the third largest industry in the county, employing 12.7 percent of the workforce. The median household income in Yancey County in 2007 was \$35,913.

SECTION 4

HAZARD IDENTIFICATION

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

OVERVIEW

The Toe River Region is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and interim guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused hazards (i.e., technological hazards, terrorism, etc.) is encouraged, though not required, for plan approval. The Toe River Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the Toe River Region (Avery County, McDowell County, Mitchell County, and Yancey County) have identified a number of hazards that are to be addressed in its Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP) members, research of past disaster declarations in the participating counties¹, and review of the North Carolina State Hazard Mitigation Plan (2004). Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of natural hazards initially identified for inclusion in the plan and provides a brief description for each. This table includes 23 individual hazards. Some of these hazards are considered to be interrelated or cascading, but for preliminary hazard identification purposes these individual hazards are broken out separately.

Next, **Table 4.2** documents the evaluation process used for determining which of the initially identified hazards are considered significant enough for further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the TRRHMP Planning Committee during the plan update process.

¹ A complete list of disaster declarations for the Toe River Region can be found in Section 3: Community Profile.

Lastly, **Table 4.3** provides a summary of the hazard identification and evaluation process noting that 15 of the 23 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

TABLE 4.1: DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS

Hazard	Description
ATMOSPHERIC HAZARDS	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Hailstorm	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.
Heat Wave	A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.
Hurricane and Tropical Storm	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Nor’easter	Similar to hurricanes, nor’easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of

	the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.
Severe Thunderstorm	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines.
Winter Storm and Freeze	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC HAZARDS	
Dam and Levee Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning.
Erosion	Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.
Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the

	<p>shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.</p>
GEOLOGIC HAZARDS	
Earthquake	<p>A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.</p>
Expansive Soils	<p>Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor, or can be severe enough for the home to be structurally unsafe.</p>
Landslide	<p>The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.</p>
Land Subsidence	<p>The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.</p>
Tsunami	<p>A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.</p>
Volcano	<p>A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from</p>

	below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
OTHER HAZARDS	
Hazardous Materials Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.
Terror Threat	Terrorism is defined by FEMA as, "the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom." Terrorist acts may include assassinations, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons.
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

Table 4.2: Documentation of the Hazard Evaluation Process

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
ATMOSPHERIC HAZARDS			
Avalanche	NO	<ul style="list-style-type: none"> Review of US Forest Service National Avalanche Center web site Review of the NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of previous Hazard Mitigation Plans in the Toe River counties 	<ul style="list-style-type: none"> There is no risk of avalanche events in North Carolina. The United States avalanche hazard is limited to mountainous western states including Alaska, as well as some areas of low risk in New England. Avalanche hazard was removed from the North Carolina State Hazard Mitigation Plan after determining the mountain elevation in Western North Carolina did have enough snow not produce this hazard. Avalanche was not included in any of the previous Toe River hazard mitigation plans.
Drought	YES	<ul style="list-style-type: none"> Review of the NC State Hazard Mitigation Plan Review of the North Carolina Drought Monitor website Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> There are reports of drought conditions in nine out of the last ten years in the Toe River Region, according to the North Carolina Drought Monitor. Droughts are discussed in NC State Hazard Mitigation Plan as a lesser hazard. The NC State Hazard Mitigation Plan lists Drought as one of the top hazard for the mountain 1 and mountain 2 regions which include the Toe River counties. Drought is included in three of the four counties' previous hazard mitigation plans
Hailstorm	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment 	<ul style="list-style-type: none"> Hailstorm events are discussed in the state plan under the Severe Thunderstorm hazard. NCDC reports 120 hailstorm events (3/4 inch size hail to 2.75 inches) for the Toe River Region between 1958 and December 2009. For these events there

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		<ul style="list-style-type: none"> Review of NOAA NCDC Storm Events Database Review of previous hazardous mitigation plans in the Toe River counties 	<p>are over \$2.8 million in property damages but no deaths or injuries.</p> <ul style="list-style-type: none"> Although hail is not addressed as an individual hazard in any of the previous county hazard mitigation plans, it is addressed as a sub-item under various hazards. Given the frequency of the event, individual analysis is warranted.
Heat Wave	NO	<ul style="list-style-type: none"> Review of NOAA NCDC Storm Events Database Review of the North Carolina State Hazard Mitigation Plan Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> NCDC does not report any extreme heat event for the Toe River counties. The NC State Hazard Mitigation Plan does not include Heat Wave as a top hazard for the Mountain 1 or Mountain 2 region which includes the Toe River counties. The NC State Hazard Mitigation Plan reports the western portion of the state as having the lowest vulnerability in the state. Heat Wave was mentioned in three of the four counties' previous hazard mitigation plans coincided with the drought hazard. However, no events were reported.
Hurricane and Tropical Storm	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website Review of NOAA NCDC Storm Events Database Review of historical presidential disaster declarations FEMA HAZUS-MH storm return periods Review of previous 	<ul style="list-style-type: none"> Hurricane and tropical storm events are discussed in the state plan and are listed as a top hazard in the Mountain 1 and Mountain 2 regions which include the Toe River Counties. NOAA historical records indicate 2 hurricanes, 11 tropical storms, and 19 tropical depressions have come within 75 miles of the Toe River Region between 1851 and 2008. Three out of ten disaster declarations in the Toe River Region are directly related to hurricane and tropical storm events. The 50-year return period peak gust for hurricane and tropical storm events in the Toe River Region is between 50-98

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		hazardous mitigation plans in the Toe River counties	mph. <ul style="list-style-type: none"> Hurricane and Tropical Storm hazard was addressed in three of the four previous Toe River county plans.
Lightning	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of NOAA NCDC Storm Events Database, NOAA lightning statistics Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> Lightning events are discussed in the state plan as part of the Severe Thunderstorm hazard, NCDC reports 10 lightning events for the Toe River Region between July 1994 and December 2009. These events have resulted in a recorded 1 death, 14 injuries and \$292,000 in property damage. Although lightning is not addressed as an individual hazard in any of the previous Toe River county-level hazard mitigation plans, it is addressed under a larger hazard category such as severe thunderstorms. Given the damage and reported death and injuries, individual analysis is warranted.
Nor'easter	NO	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of NOAA NCDC Storm Events Database Review of previous hazardous mitigation plans in the Toe River 	<ul style="list-style-type: none"> Nor'easters are discussed in the state plan as a part of the Hurricane hazard. The mountain region, which includes the Toe River Region, has the lowest vulnerability in the state. NCDC does not report any Nor'easter activity for the Toe River Region. However, Nor'easter may have affected the region as severe winter storms. In this case, the activity would be

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		counties	<p>reported under winter storm events.</p> <ul style="list-style-type: none"> This hazard was not addressed in any of the previous plans.
Tornado	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of NOAA NCEM Storm Events Database Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> Tornado events are discussed in the NC State Hazard Mitigation Plan under Severe Thunderstorms. NCEM reports 6 tornado events in Toe River Region Counties between 1979 and December 2009. These events have resulted in no recorded deaths but have caused one injury and \$1.8 million in property damage with the most severe being an F2. Tornado events were addressed in three of the four previous Toe River county plans.
Severe Thunderstorm	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of NOAA NCEM Storm Events Database Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> Severe Thunderstorm events are discussed in the NC State Hazard Mitigation Plan. The Mountain Region, including the Toe River counties, has the greatest vulnerability in the state. According to the NC State Hazard Mitigation Plan, Severe Thunderstorm is top hazard in the Mountain 1 region and Mountain 2 region which include the Toe River counties. NCEM reports 223 thunderstorm events in the Toe River Region counties between 1985 and December 2009. These events have resulted in \$7.4 million (2009 dollars) in property damage. Severe Thunderstorm events were addressed in all of the previous Toe River county plans.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Winter Storm and Freeze	YES	<ul style="list-style-type: none"> • Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of historical presidential disaster declarations. • Review of NOAA NCEM Storm Events Database • Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> • Severe Winter Storms including snow storms and ice storms are discussed in the state plan. They are listed as a top hazard in the Mountain 1 and Mountain 2 regions which include the Toe River Region counties. The Region has the second highest vulnerability to Severe Winter Storms in the state. • NCEM reports that the Toe River Counties have been affected by 629 snow and ice events between 1993 and December 2009. These events resulted in 2 reported deaths and over \$39 million (2009 dollars) in damages but did not cause any injuries. • Three of the Region's ten disaster declarations were directly related to winter storm events. • Winter Storm events were addressed in all of the previous Toe River county plans.
HYDROLOGIC HAZARDS			
Dam and Levee Failure	YES	<ul style="list-style-type: none"> • Review of NC State Hazard Mitigation Plan • Review of North Carolina Division of Land Management web site • Review of U.S. Army Corps of Engineers National Inventory of Dams database • Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> • Dam Failure is discussed in the state plan as a hazard of concern for Toe River Region Counties (classified under "man-made disasters"). It is a top hazard for Mountain Region 1 which includes McDowell, Mitchell, and Yancey counties. However, the Toe River counties do not have the greatest vulnerability in the state. • Of the 77 dams reported on the National Inventory of Dams, 40 are high hazard (52%), (High hazard is defined as "where failure or mis-operation will probably cause loss of human life.") • Three of the four previous Toe River hazard mitigation county plans address dam failure.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Erosion	YES	<ul style="list-style-type: none"> Review of the previous Toe Region County hazard mitigation plans. Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment 	<ul style="list-style-type: none"> Areas of concern were identified in the previous Avery County and Yancey County Multi-Jurisdictional Hazard Mitigation Plans (2005). Coastal erosion is discussed in the state plan but only for coastal areas (no discussion of riverine erosion).
Flood	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of historical disaster declarations Review of NOAA NCEM Storm Events Database Review of FEMA's NFIP Community Status Book and Community Rating System (CRS) Review of FEMA Q3 flood data for the Toe River Region counties Review of previous hazardous mitigation plans in the Toe River counties 	<ul style="list-style-type: none"> The flood hazard is thoroughly discussed in the state plan. Four out of ten Presidential Disaster Declarations were flood-related and an additional three were hurricane or tropical storm-related which like brought flooding issues. NCEM reports that Toe River Region Counties has been affected by 56 flood events between March 1993 and December 2009. These events in total caused no reported deaths or injuries but an estimated \$81 million in property damages. Nearly 0.03% of the Toe River Region is located in an identified floodplain (100 or 500 year). Nearly all municipalities participate in the NFIP. All of the previous counties in the Toe River Region address flood hazard.
Storm Surge	NO	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of previous hazardous mitigation plans in 	<ul style="list-style-type: none"> Storm surge is discussed in the state plan under the hurricane hazard and indicates that the mountain region has zero vulnerability to storm surge. None of the previous hazard mitigation plans in the Toe River Region address

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		<p>the Toe River counties</p> <ul style="list-style-type: none"> Review of NOAA NCEC Storm Events Database 	<p>storm surge.</p> <ul style="list-style-type: none"> No historical events were reported by NCEC Given the inland location of the Toe River Region, Storm Surge would affect the area.
GEOLOGIC HAZARDS			
Earthquake	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of previous hazardous mitigation plans in the Toe River counties USGS Earthquake Hazards Program web site Review of the National Geophysical Data Center Review of FEMA's Multi-Hazard Identification and Risk Assessment 	<ul style="list-style-type: none"> Earthquake events are discussed in the state plan and all of the participating counties in the Toe River Region are considered to be at moderate risk to an earthquake event (no counties are high risk). All of the previous plans in the Toe River region address earthquake. Earthquakes have occurred in and around the State of North Carolina in the past. The state is affected by the Charleston and the New Madrid (near Missouri) Fault lines which have generated a magnitude 8.0 earthquake in the last 200 years. 44 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a 6. According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Toe River Region is approximately 5%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.
Expansive Soils	NO	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of FEMA's Multi-Hazard 	<ul style="list-style-type: none"> Expansive soils are identified in the state plan; however neither Mountain Region 1 nor 2 identifies expansive soils as a top hazard. According to FEMA and USDA sources,

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Identification and Risk Assessment <ul style="list-style-type: none"> • Review of USDA Soil Conservation Service's Soil Survey • Review of previous Toe River county hazard mitigation plans 	the Toe River Region is located in an area that has a "little to no" clay swelling potential. <ul style="list-style-type: none"> • Previous Toe River county hazard mitigation plans do not identify Land Subsidence as a hazard.
Landslide	YES	<ul style="list-style-type: none"> • Review of NC State Hazard Mitigation Plan • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides • Review of previous Toe River county hazard mitigation plans 	<ul style="list-style-type: none"> • Landslide/Debris Flow events are discussed in the state plan, and ranked as the top hazard in the Mountain 1 and Mountain 2 regions which include the Toe River counties. Further, the mountain region received the highest vulnerability score in the state. • USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landsliding) for some areas in Mitchell and Yancey counties. The remaining areas are moderate or low incident with high susceptibility. • Data provided by NCGS indicate 172 recorded landslide events in the Toe River Region • All of the previous Toe River county hazard mitigation plans address landslides.
Land Subsidence	NO	<ul style="list-style-type: none"> • Review of NC State Hazard Mitigation Plan • Review of previous Toe River county hazard mitigation plans. 	<ul style="list-style-type: none"> • The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina; however none of these areas are located in Toe River counties. • The plan identifies the Toe River counties as having a zero on the land subsidence hazard. • Previous Toe River county hazard mitigation plans do not identify Land Subsidence as a hazard.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tsunami	NO	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of previous Toe River county hazard mitigation plans. Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses"). 	<ul style="list-style-type: none"> Tsunamis are discussed in the state plan and described as a "greater" hazard for the state. However, the mountain region scored a zero for tsunami hazard risk. None of the previous county plans in the Toe River Region address tsunami. No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	NO	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of USGS Volcano Hazards Program web site 	<ul style="list-style-type: none"> There are no active volcanoes in North Carolina. There has not been a volcanic eruption in North Carolina in over 1 million years. No volcanoes are located remotely near the Toe River Region.
OTHER HAZARDS			
Dam and Levee Failure	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of previous Toe River county hazard mitigation plans. Review of North 	<ul style="list-style-type: none"> Dam Failure is a top hazard for Mountain Region 1 which includes McDowell, Mitchell, and Yancey counties. However, the Toe River counties do not have the greatest vulnerability in the state. Dam Failure is addressed in three of the four previous hazard mitigation plans in

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		<p>Carolina Division of Land Management web site</p> <ul style="list-style-type: none"> Review of U.S. Army Corps of Engineers National Inventory of Dams database 	<p>the Toe River Region.</p> <ul style="list-style-type: none"> Of the 77 dams reported on the National Inventory of Dams in the Toe River Region, 40 are high hazard (52%), (High hazard is defined as “where failure or mis-operation will probably cause loss of human life.”)
Hazardous Materials Incident	YES	<ul style="list-style-type: none"> Review of previous Toe River county hazard mitigation plans. 	<ul style="list-style-type: none"> The Mitchell County Hazard Mitigation Plan included hazardous materials incident in its previous plan.
Terror Threat	YES	<ul style="list-style-type: none"> Review of previous Toe River county hazard mitigation plans. Review of the NC State Hazard Mitigation Plan Review of local official knowledge 	<ul style="list-style-type: none"> The Mitchell County Hazard Mitigation Plan included terrorism threat as a hazard. The NC State Hazard Mitigation Plan does not include terrorism as a hazard. There are several high profiles targets in the area.
Wildfire	YES	<ul style="list-style-type: none"> Review of NC State Hazard Mitigation Plan Review of previous Toe River county hazard mitigation plans. Review of Southern Wildfire Risk Assessment (SWRA) Data Review of the NC Division of Forest Resources website 	<ul style="list-style-type: none"> Wildfires are discussed in the state plan as a “greater” hazard of concern. Four out of the six wildfire occurrences detailed in the state plan are in Mitchell or McDowell Counties. All of the previous counties in the Toe River Region addressed wildfire. The state plan lists wildfire as a top hazard in Mountain 1 and Mountain 2. A review of SWRA data indicates that there are 0.06 square miles of moderate fire vulnerability in the Toe River Region. According to the North Carolina Division of Forest Resources, the Toe River Region experiences an average of 32 fires each year which burn a combined 95 acres. This data also indicates that McDowell County is at an

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			<p>increased risk with an average of 74 fires annually which burn a combined 176 acres.</p> <ul style="list-style-type: none"> Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases.

TABLE 4.3: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

ATMOSPHERIC HAZARDS	GEOLOGIC HAZARDS
<input type="checkbox"/> Avalanche	<input checked="" type="checkbox"/> Earthquake
<input checked="" type="checkbox"/> Drought	<input type="checkbox"/> Expansive Soils
<input checked="" type="checkbox"/> Hailstorm	<input checked="" type="checkbox"/> Landslide
<input type="checkbox"/> Heat Wave	<input type="checkbox"/> Land Subsidence
<input checked="" type="checkbox"/> Hurricane and Tropical Storm	<input type="checkbox"/> Tsunami
<input checked="" type="checkbox"/> Lightning	<input type="checkbox"/> Volcano
<input type="checkbox"/> Nor'easter	OTHER HAZARDS
<input checked="" type="checkbox"/> Tornado	<input checked="" type="checkbox"/> Hazardous Materials Incident
<input checked="" type="checkbox"/> Severe Thunderstorm	<input checked="" type="checkbox"/> Terror Threat
<input checked="" type="checkbox"/> Winter Storm and Freeze	<input checked="" type="checkbox"/> Wildfire
HYDROLOGIC HAZARDS	
<input checked="" type="checkbox"/> Dam and Levee Failure	
<input checked="" type="checkbox"/> Erosion	
<input checked="" type="checkbox"/> Flood	
<input type="checkbox"/> Storm Surge	

☒ = Hazard considered significant enough for further evaluation in the Toe River Region hazard risk assessment.

SECTION 5

HAZARD PROFILES

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

This section of the Plan provides a detailed assessment of the hazards identified to pose a threat to the Toe River Region. The remainder of this section is comprised of the following subsections:

5.1: Overview	5.11: Landslide
5.2: Study Area	5.12: Dam and Levee Failure
5.3: Drought	5.13: Erosion
5.4: Hailstorm	5.14: Flood
5.5: Hurricane and Tropical Storm	5.15: Hazardous Materials Incident
5.6: Lightning	5.16: Terror Threat
5.7: Severe Thunderstorm	5.17: Wildfire
5.8: Tornado	5.18: Conclusions of Hazard Risk
5.9: Winter Storm and Freeze	5.19: Final Determinations
5.10: Earthquake	

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the Toe River Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard, its location and extent, notable historical occurrences and the probability of future occurrences. Each profile also includes specific items noted by members of the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP) as it relates to unique historical or anecdotal hazard information for the counties in the Toe River Region or a participating municipality within them.

The following hazards were identified:

- **Atmospheric**
 - Drought
 - Hailstorm
 - Hurricane and Tropical Storm (including Nor'easters)
 - Lightning
 - Severe Thunderstorm (including straight-line winds)

- Tornado
- Winter Storm and Freeze

- **Geologic**
 - Earthquake
 - Landslide

- **Hydrologic**
 - Dam and Levee Failure
 - Erosion
 - Flood

- **Other**
 - Hazardous Materials Incident
 - Terror Threat
 - Wildfire

5.2 STUDY AREA

The Toe River Region includes four counties: Avery, McDowell, Mitchell, and Yancey. **Table 5.1** provides a summary table of the participating jurisdictions within each county. In addition, **Figure 5.1** provides a base map, for reference, of the Toe River Region.

**TABLE 5.1: PARTICIPATING AREAS IN THE TOE RIVER REGIONAL
HAZARD MITIGATION PLAN**

Avery County	
Banner Elk	Grandfather Village
Crossnore	Sugar Mountain
Elk Park	Newland
McDowell County	
Marion	Old Fort
Mitchell County	
Bakersville	Spruce Pine
Yancey County	
Burnsville	

FIGURE 5.1: TOE RIVER REGION BASE MAP

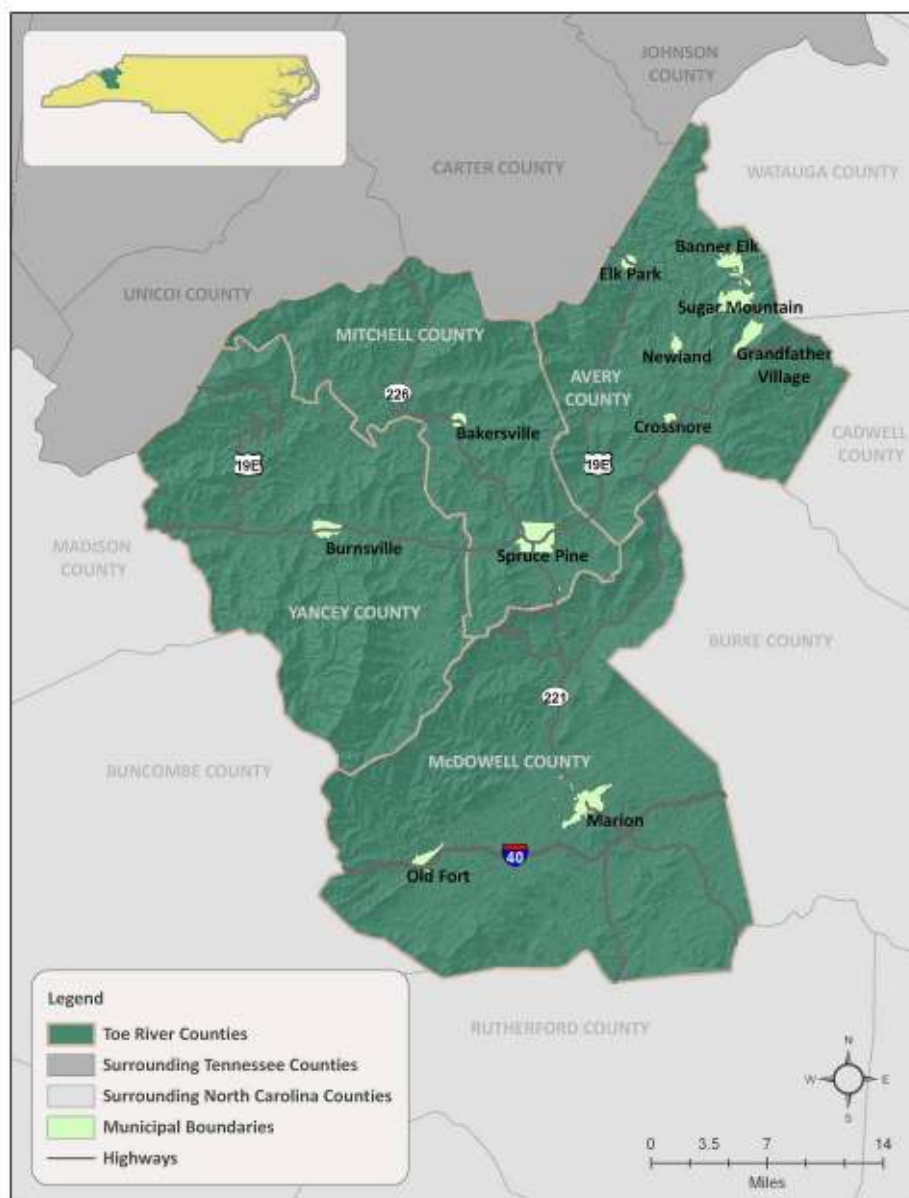


Table 5.2 lists each significant hazard for the Toe River Region and identifies whether or not it has been determined to be a specific hazard of concern for the 11 municipal jurisdictions and each of the four county's unincorporated areas. This is based on the best available data and information from the Toe River Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE TOE RIVER REGION

Jurisdiction	Atmospheric							Geologic		Hydrologic			Other		
	Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm	Earthquake	Landslide	Dam Failure	Erosion	Flood	HAZMAT	Terror Threat	Wildfire
Avery County															
Banner Elk	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Crossnore	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Elk Park	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Grandfather Village	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Newland	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sugar Mountain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
McDowell County															
Marion	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Old Fort	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mitchell County															
Bakersville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Spruce Pine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Yancey County															
Burnsville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Atmospheric Hazards

5.3 DROUGHT

5.3.1 Background

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts.

Droughts are typically classified into one of four types: 1) meteorological, 2) hydrologic, 3) agricultural, or 4) socioeconomic. **Table 5.3** presents definitions for these types of drought.

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

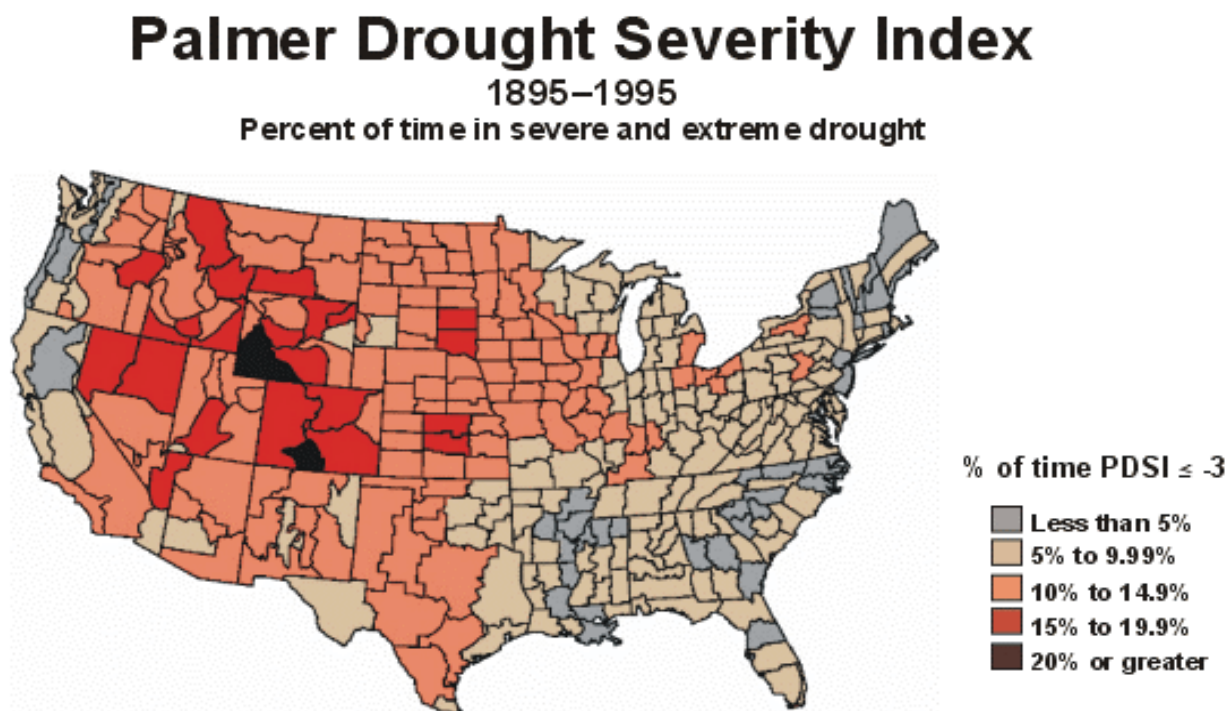
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Droughts are slow-onset hazards, but, over time, can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impact can be significant.

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United States, drought affects most areas of the United States, but is less severe in the Eastern United States.

FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (Figure 4.2), Eastern North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Further, it is assumed that the Toe River Region would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

5.3.3 Historical Occurrences

Data from the North Carolina Drought Management Advisory Council and National Climatic Data Center (NCDC) were used to ascertain historical drought and heat wave events for the Toe River Region. The North Carolina Drought Management Advisory Council reports data on North Carolina drought conditions from 2000 to 2009 through the North Carolina Drought Monitor. It classifies drought conditions by county on a scale of D0 to D4:

- D0: Abnormally Dry
- D1: Moderate Drought
- D2: Severe Drought
- D3: Extreme Drought

- D4: Exceptional Drought

According to the North Carolina Drought Monitor, all counties in the Toe River Region have had drought occurrences nine of the last ten years (2000-2009) (**Table 5.4**). In addition, **Table 5.5** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications.¹

TABLE 5.4: SUMMARY OF DROUGHT OCCURRENCES IN THE TOE RIVER REGION

Location	Number Years with Drought Occurrences
Avery County	9
McDowell County	9
Mitchell County	9
Yancey County	9
TOE RIVER REGION TOTAL	9

Source: North Carolina Drought Monitor

TABLE 5.5: HISTORICAL DROUGHT OCCURRENCES IN THE TOE RIVER REGION

	Avery County	McDowell County	Mitchell County	Yancey County
2000	Extreme Drought	Extreme Drought	Exceptional Drought	Extreme Drought
2001	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2002	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2003	Normal	Normal	Normal	Normal
2004	Abnormally Dry	Abnormally Dry	Abnormally Dry	Abnormally Dry
2005	Moderate Drought	Moderate Drought	Abnormally Dry	Abnormally Dry
2006	Severe Drought	Severe Drought	Severe Drought	Severe Drought
2007	Exceptional Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2008	Exceptional Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2009	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought

Source: North Carolina Drought Monitor

5.3.4 Probability of Future Occurrences

It is assumed that all of the Toe River Region has a high probability of future drought events. However, based on historical information, there is a much lower probability for extreme, long-lasting drought conditions.

¹ Each County's Cooperative Extension Office was contacted to determine if drought loss data was available. However, the contacts indicated that such information is not tracked.

5.4 HAILSTORM

5.4.1 Background

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed separately in Section 5.7). Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size.

5.4.2 Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that the Toe River Region is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hail which may be produced by such storms.

5.4.3 Historical Occurrences

According to the National Climatic Data Center, 120 recorded hailstorm events have affected the Toe River Region since 1958.² **Table 5.6** is a summary of the hail events in the Toe River Region. **Table 5.7** provides detailed information about each event that occurred in the county. Although hail can occur anywhere, **Figure 5.3** indicates the location of historical hail occurrences. In all, hail occurrences resulted in over \$2.8 million in property damages (2009 dollars), most of which were reported in McDowell County. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment, so it is likely that damages are greater than the reported value. Further, a single storm event may have affected multiple counties.

TABLE 5.6: SUMMARY OF HAIL OCCURRENCES IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009)
Avery County	32	\$0
Banner Elk	3	\$0
Crossnore	3	\$0
Elk Park	3	\$0
Grandfather Village	0	\$0
Newland	10	\$0
Sugar Mountain	0	\$0
Unincorporated Area	13	\$0
McDowell County	51	\$2,795,212
Marion	25	\$2,795,212

² These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected the Toe River Region. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

Old Fort	9	\$0
Unincorporated Area	17	\$0
Mitchell County	17	\$11,255
Bakersville	8	\$0
Spruce Pine	2	\$11,255
Unincorporated Area	7	\$0
Yancey County	20	\$0
Burnsville	9	\$0
Unincorporated Area	11	\$0
TOE RIVER REGION TOTAL	120	\$2,806,467

Source: National Climatic Data Center

TABLE 5.7: HISTORICAL HAIL OCCURRENCES IN THE TOE RIVER REGION

	Date	Magnitude	Deaths/Injuries	Property Damage*
Avery County				
Avery County	06/03/71	1.50 in.	0/0	0
Avery County	12/18/77	0.75 in.	0/0	0
Avery County	06/05/85	0.75 in.	0/0	0
Avery County	06/07/85	1.00 in.	0/0	0
Avery County	04/27/89	1.75 in.	0/0	0
Ingalls	05/05/96	1.75 in.	0/0	0
Banner Elk	03/05/97	0.75 in.	0/0	0
Hughes	06/02/97	1.00 in.	0/0	0
Banner Elk	09/11/97	1.50 in.	0/0	0
Newland	03/20/98	0.75 in.	0/0	0
Crossnore	05/07/98	1.00 in.	0/0	0
Newland	05/13/99	1.00 in.	0/0	0
Linville	04/17/00	1.00 in.	0/0	0
Newland	04/28/02	1.00 in.	0/0	0
Linville	05/27/02	1.00 in.	0/0	0
Linville	07/02/02	0.75 in.	0/0	0
Newland	05/15/03	1.75 in.	0/0	0
Crossnore	06/08/03	0.88 in.	0/0	0
Crossnore	05/21/04	0.75 in.	0/0	0
Elk Park	08/03/05	0.88 in.	0/0	0
Newland	08/04/05	0.75 in.	0/0	0
Elk Park	04/02/06	1.00 in.	0/0	0
Newland	04/19/06	0.75 in.	0/0	0
Linville	05/14/06	0.75 in.	0/0	0
Elk Park	05/30/06	0.88 in.	0/0	0
Newland	06/12/07	0.88 in.	0/0	0
Linville	06/26/07	0.75 in.	0/0	0
Newland	08/23/07	0.75 in.	0/0	0
Ingalls	08/24/07	0.75 in.	0/0	0
Newland	06/07/08	0.75 in.	0/0	0
Banner Elk	06/09/08	2.75 in.	0/0	0
Newland	07/20/09	0.75 in.	0/0	0

SECTION 5: HAZARD PROFILES

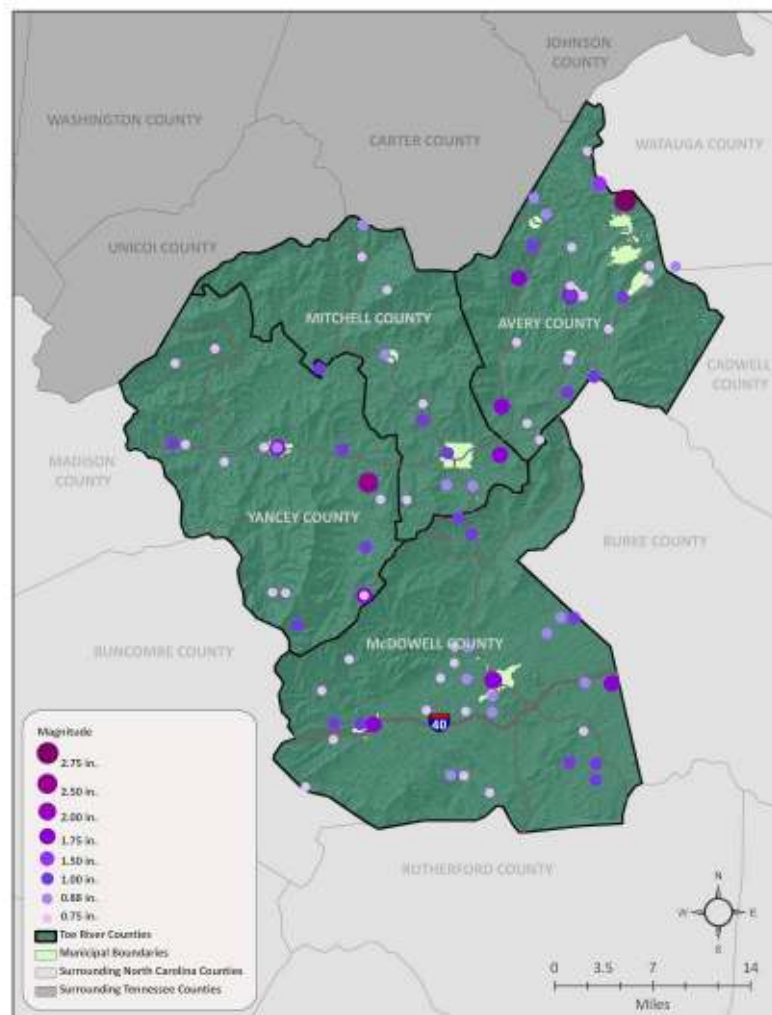
	Date	Magnitude	Deaths/Injuries	Property Damage*
McDowell County				
McDowell County	06/20/74	0.75 in.	0/0	\$0
McDowell County	06/16/80	1.75 in.	0/0	\$0
McDowell County	06/07/85	1.75 in.	0/0	\$0
McDowell County	07/10/85	0.75 in.	0/0	\$0
McDowell County	06/05/89	1.75 in.	0/0	\$0
McDowell County	08/21/90	0.75 in.	0/0	\$0
Marion	05/25/96	1.00 in.	0/0	\$0
Marion	06/02/97	2.00 in.	0/0	\$2,795,212
Marion	07/04/97	0.88 in.	0/0	\$0
Marion	05/26/98	0.75 in.	0/0	\$0
Marion	05/27/98	0.75 in.	0/0	\$0
Old Fort	09/28/98	0.75 in.	0/0	\$0
Marion	04/27/99	0.75 in.	0/0	\$0
Ashford	08/20/99	1.00 in.	0/0	\$0
Marion	04/17/00	0.75 in.	0/0	\$0
Old Fort	05/13/00	0.88 in.	0/0	\$0
Sugar Hill	05/20/00	0.75 in.	0/0	\$0
Marion	05/24/00	1.75 in.	0/0	\$0
Marion	06/03/00	0.75 in.	0/0	\$0
Marion	06/14/00	0.75 in.	0/0	\$0
Old Fort	06/04/01	1.00 in.	0/0	\$0
Pleasant Gardens	08/02/02	0.75 in.	0/0	\$0
Old Fort	05/15/03	1.00 in.	0/0	\$0
Old Fort	06/08/03	1.00 in.	0/0	\$0
Sugar Hill	07/12/03	0.75 in.	0/0	\$0
Marion	07/18/03	0.88 in.	0/0	\$0
Sugar Hill	08/09/03	0.75 in.	0/0	\$0
Marion	05/08/04	1.75 in.	0/0	\$0
Ashford	05/19/04	0.88 in.	0/0	\$0
Marion	05/23/04	0.75 in.	0/0	\$0
Marion	05/14/05	0.88 in.	0/0	\$0
Marion	07/27/05	0.88 in.	0/0	\$0
Dysortville	04/03/06	1.00 in.	0/0	\$0
Pleasant Gardens	04/08/06	0.75 in.	0/0	\$0
Marion	05/13/06	0.88 in.	0/0	\$0
Marion	05/31/06	0.75 in.	0/0	\$0
Marion	06/02/06	0.88 in.	0/0	\$0
Marion	06/11/06	0.88 in.	0/0	\$0
Marion	06/23/06	1.75 in.	0/0	\$0
Old Fort	07/20/06	0.75 in.	0/0	\$0
Sugar Hill	08/08/06	0.75 in.	0/0	\$0
Marion	09/28/06	0.88 in.	0/0	\$0
Marion	04/15/07	0.75 in.	0/0	\$0
Marion	06/08/07	1.00 in.	0/0	\$0
Marion	06/23/07	0.88 in.	0/0	\$0
Old Fort	06/28/07	0.75 in.	0/0	\$0

SECTION 5: HAZARD PROFILES

	Date	Magnitude	Deaths/Injuries	Property Damage*
Old Fort	06/29/07	0.75 in.	0/0	\$0
Old Fort	06/07/08	0.75 in.	0/0	\$0
Marion	06/22/08	1.00 in.	0/0	\$0
Davistown	06/09/09	0.75 in.	0/0	\$0
Cross Mill	06/10/09	0.88 in.	0/0	\$0
Mitchell County				
Mitchell County	06/05/85	0.88 in.	0/0	\$0
Mitchell County	06/07/85	0.75 in.	0/0	\$0
Spruce Pine	05/05/96	0.75 in.	0/0	\$0
Spruce Pine	08/22/96	0.75 in.	0/0	\$0
Spruce Pine	05/07/98	0.88 in.	0/0	\$0
Buladean	04/28/02	0.75 in.	0/0	\$0
Bakersville	07/02/02	0.75 in.	0/0	\$0
Spruce Pine	05/15/03	1.75 in.	0/0	\$0
Spruce Pine	05/08/04	1.00 in.	0/0	\$0
Spruce Pine	05/10/05	0.88 in.	0/0	\$11,255
Buladean	05/18/06	0.88 in.	0/0	\$0
Spruce Pine	06/08/07	0.75 in.	0/0	\$0
Buladean	06/09/08	0.88 in.	0/0	\$0
Bakersville	06/22/08	0.75 in.	0/0	\$0
Spruce Pine	06/26/08	1.00 in.	0/0	\$0
Buladean	08/02/08	0.88 in.	0/0	\$0
Ledger	06/09/09	1.00 in.	0/0	\$0
Yancey County				
Yancey County	06/10/69	2.50 in.	0/0	\$0
Yancey County	04/23/88	0.75 in.	0/0	\$0
Yancey County	07/17/88	0.75 in.	0/0	\$0
Burnsville	05/07/98	1.75 in.	0/0	\$0
Burnsville	06/03/98	1.00 in.	0/0	\$0
Burnsville	07/24/99	1.00 in.	0/0	\$0
Ramseytown	08/20/99	0.75 in.	0/0	\$0
Busick	06/04/02	1.75 in.	0/0	\$0
Busick	04/30/03	1.00 in.	0/0	\$0
Burnsville	05/26/04	0.75 in.	0/0	\$0
Busick	05/10/05	0.75 in.	0/0	\$0
Burnsville	04/02/06	0.75 in.	0/0	\$0
Eskota	05/13/06	0.75 in.	0/0	\$0
Burnsville	06/23/06	0.75 in.	0/0	\$0
Burnsville	06/08/07	0.75 in.	0/0	\$0
Burnsville	06/28/07	0.75 in.	0/0	\$0
Green Mountain	06/22/08	1.00 in.	0/0	\$0
Hamrick	04/10/09	1.00 in.	0/0	\$0
Cave River	04/24/09	0.75 in.	0/0	\$0
Burnsville	06/11/09	0.88 in.	0/0	\$0

*Property damage is reported in 2009 dollars; All damage may not have been reported.

Source: National Climatic Data Center

FIGURE 5.3: LOCATION OF HISTORICAL HAIL EVENTS IN THE TOE RIVER REGION

Source: National Climatic Data Center

5.4.4 Probability of Future Occurrences

Given that severe thunderstorm events will remain a frequent occurrence for the Toe River Region, the probability of future hail occurrences is highly likely. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region. Further, hail is an atmospheric hazard, so it is assumed that the entire Toe River Region has equal exposure to this hazard.

5.5 HURRICANE AND TROPICAL STORM

5.5.1 Background

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a “safety-valve,” limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six (6).

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (**Table 5.8**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.






TABLE 5.8: SAFFIR-SIMPSON SCALE

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (Millibars)	Storm Surge (Feet)
1	74–95	Greater than 980	3–5
2	96–110	979–965	6–8
3	111–130	964–945	9–12
4	131–155	944–920	13–18
5	155 +	Less than 920	19+

Source: National Hurricane Center

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure and storm surge potential, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as “major” hurricanes, and while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. **Table 5.9** describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.9: HURRICANE DAMAGE CLASSIFICATIONS

Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Sources: National Hurricane Center; Federal Emergency Management Agency

Similar to hurricanes, coastal storms are ocean-fueled storm events capable of causing substantial damage due to their associated strong winds and heavy surf. The Nor'easter is a particularly devastating type of coastal storm, named for the winds that blow in from the northeast and drive the storm up the U.S. East Coast alongside the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor'easters are known for dumping heavy amounts of rain and snow and producing hurricane-force winds. **Table 5.10** shows the Dolan-Davis Nor'easter Intensity Scale. It should be noted that strong Nor'easters have increased in recent years.

TABLE 5.10: DOLAN-DAVIS NOR'EASTER INTENSITY SCALE (1993)

Storm Class	Beach Erosion	Dune Erosion	Overwash	Property Damage
1 (Weak)	Minor changes	None	No	No
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest
3 (Significant)	Erosion extends across beach	Can be significant	No	Loss of many structures at local level
4 (Severe)	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale
5 (Extreme)	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive losses on a regional-scale

Source: Davis and Dolan, 1993; North Carolina Department of Crime Control and Public Safety

5.5.2 Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. All areas in the region are susceptible to coastal storms and nor'easters.

5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 32 hurricane, tropical storm, or tropical depression tracks have passed within 75 miles of the Toe River Region since 1850.³ This includes: zero (0) Category 5 hurricanes; zero (0) Category 4 hurricanes; zero (0) Category 3 hurricanes; one (1) Category 2 hurricane; one (1) Category 1 hurricane; eleven (11) tropical storms; and 19 (nineteen) tropical depressions. Of the recorded storm events, 2 tropical depressions traversed directly through the Toe River Region. **Table 5.11** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Toe River Region) and Category of the storm based on the Saffir-Simpson Scale. **Figure 5.4** shows the track of each recorded storm.

TABLE 5.11: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE TOE RIVER REGION (1850–2008)

Date of Occurrence	Storm Name	Maximum Wind Speed (miles per hour)	Storm Category
9/17/1859	Not Named	40	Tropical Storm
9/11/1882	Not Named	40	Tropical Storm
6/22/1886	Not Named	40	Tropical Storm
9/24/1889	Not Named	45	Tropical Storm

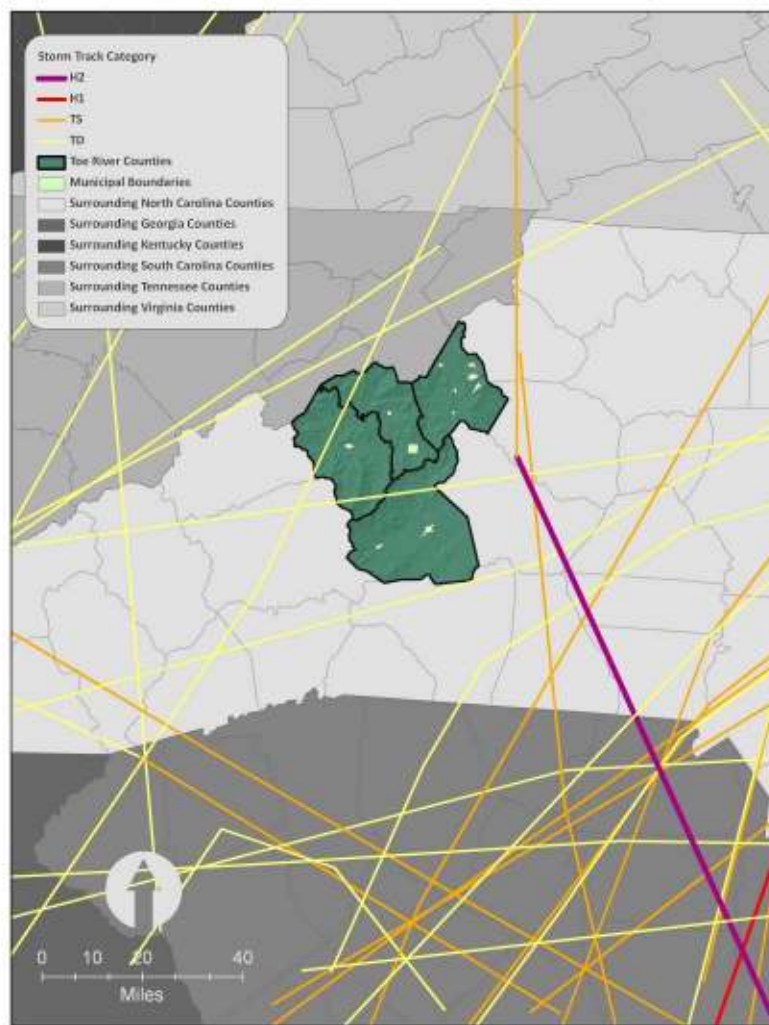
³ These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

SECTION 5: HAZARD PROFILES

8/28/1893	Not Named	75	Category 1
7/8/1896	Not Named	30	Tropical Depression
9/18/1906	Not Named	40	Tropical Storm
9/4/1913	Not Named	30	Tropical Depression
8/3/1915	Not Named	35	Tropical Storm
7/15/1916	Not Named	50	Tropical Storm
9/23/1920	Not Named	30	Tropical Depression
10/3/1927	Not Named	40	Tropical Storm
8/16/1928	Not Named	30	Tropical Depression
10/18/1932	Not Named	20	Tropical Depression
5/30/1934	Not Named	30	Tropical Depression
8/18/1939	Not Named	25	Tropical Depression
8/29/1949	Not Named	40	Tropical Storm
8/31/1952	Able	45	Tropical Storm
9/30/1959	Grancie	60	Tropical Storm
8/31/1964	Cleo	25	Tropical Depression
6/9/1968	Abby	25	Tropical Depression
9/24/1975	Eloise	30	Tropical Depression
9/8/1977	Babe	25	Tropical Depression
8/17/1985	Danny	30	Tropical Depression
8/29/1988	Chris	25	Tropical Depression
9/22/1989	Hugo	85	Category 2
8/17/1994	Beryl	15	Tropical Depression
7/24/1997	Danny	20	Tropical Depression
7/2/2003	Bill	20	Tropical Depression
9/8/2004	Frances	25	Tropical Depression
9/17/2004	Ivan	20	Tropical Depression
9/28/2004	Jeanne	20	Tropical Depression

Source: National Hurricane Center

FIGURE 5.4: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE TOE RIVER REGION



Source: National Oceanic and Atmospheric Administration

The National Climatic Data Center did not report any event associated with a hurricane, tropical storm, or nor'easter in the participating counties between 1950 and 2009. However, federal records indicate that disaster declarations were made in 1989 (Hurricane Hugo), 2005 (Tropical Storm Frances), and 2004 (Hurricane Ivan).⁴

5.5.4 Probability of Future Occurrences

It is possible that hurricanes and tropical storms will affect the Toe River Region. Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems which may result in flooding or high winds. Further, there is a higher probability that the region will be affected by Nor'easters, which frequently result in large snow and/or ice accumulations during the winter months.

⁴ Not all of the participating counties were declared disaster areas for these storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 3: Community Profile.

5.6 LIGHTNING

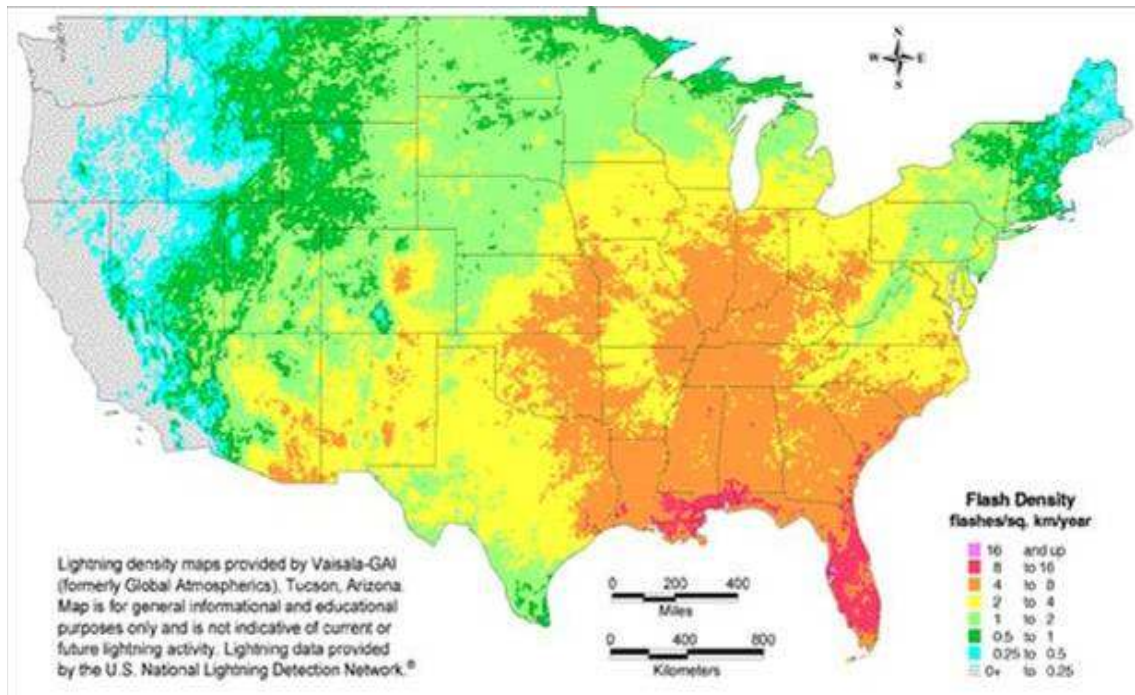
5.6.1 Background

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

Figure 5.5 shows a lightning flash density map for the years 1996-2000 based upon data provided by Vaisala’s U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.5: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala U.S. National Lightning Detection Network

5.6.2 Location and Spatial Extent

It is assumed that all of the Toe River Region is uniformly exposed to lightning. Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the Toe River Region is uniformly exposed to lightning.

5.6.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of eleven (11) recorded lightning events in the Toe River Region since 1995.⁵ These events resulted in over \$292,000 (2009 dollars) in damages, as listed in summary **Table 5.12**. Further, lightning caused two (2) fatality and sixteen (16) injuries throughout the Toe River Region. Detailed information on historical lightning events can be found in **Table 5.13**.

TABLE 5.12: SUMMARY OF LIGHTNING OCCURRENCES IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009)	Deaths/Injuries
Avery County	2	\$25,000	0/6
Banner Elk	0	\$0	0/0
Crossnore	0	\$0	0/0
Elk Park	0	\$0	0/0
Grandfather Village	0	\$0	0/0
Newland	0	\$0	0/0
Sugar Mountain	0	\$0	0/0
Unincorporated Area	2	\$25,000	0/6
McDowell County	5	\$202,851	1/4
Marion	3	\$92,423	0/2
Old Fort	0	\$0	0/0
Unincorporated Area	3	\$110,428	1/2
Mitchell County	2	\$1,159	1/5
Bakersville	1	\$0	1/5
Spruce Pine	1	\$1,159	0/0
Unincorporated Area	0	\$0	1/0
Yancey County	1	\$0	0/1
Burnsville	0	\$0	0/0
Unincorporated Area	1	\$0	0/1
TOE RIVER REGION TOTAL	11	\$229,010	2/16

Source: National Climatic Data Center

⁵ These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional lightning events have occurred in the Toe River Region. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.13: HISTORICAL LIGHTNING OCCURRENCES IN THE TOE RIVER REGION

	Date	Deaths/Injuries	Property Damage*	Details
Avery County				
Linville Falls	07/16/1995	0/6	\$0	Six people were injured by lightning as they stood outside the visitor center at Linville Falls.
Montezuma	05/15/2009	0/0	\$25,000	Lightning struck a home on Braswell Rd, igniting a fire that damaged a garage apartment.
McDowell County				
Unincorporated County	1993	1/2	\$0	A 5-year old girl died as a result of a lightning strike. Another 7 year boy and 12 year old girl were struck and injured.
Marion	08/03/1993	0/0	\$77,700	Resultant fire caused damage to a house.
Marion	07/10/1995	0/0	\$14,724	Lightning damaged a mobile home.
Forest City	09/01/1995	0/0	\$110,428	Lightning struck a home and started a fire.
Countywide	08/20/99	0/0	\$0	Numerous cloud to ground strikes in McDowell county resulted in power lines and trees catching fire, and causing power outages. Some power lines and trees were actually downed. Another strike resulted in a fire which destroyed an unoccupied house at Wildacres Retreat. Lightning caused a house fire in Casar which resulted in significant damage. A barn was destroyed along with the hay inside, by a lightning-ignited fire in Alexander Mills.
Marion	08/04/03	0/2	\$0	Lightning struck two men in a rain shelter at a golf course.
Mitchell County				
Bakersville	6/25/2000	1/5	\$0	Strong to severe thunderstorms developed in the mountains during the early afternoon and

	Date	Deaths/Injuries	Property Damage*	Details
				rumbled east across the foothills and into the western piedmont by early evening. Lightning struck a tree in a picnic area on top of Roan Mountain. A family was shocked as the lightning spread through the adjacent ground and pavement. One man fell and hit his head on the pavement. He died five days later from a blood clot in his brain. The other five people suffered minor injuries.
Spruce Pine	05/30/2004	0/0	\$1,159	Lightning struck a home.
Yancey County				
				Supercell thunderstorms developed in a highly sheared atmosphere in eastern Tennessee then moved east across the mountains, foothills and western piedmont of North Carolina. One person received minor injuries from a lightning strike in Yancey county.
Newdale	05/07/1998	0/1	\$0	

*Property damage is reported in 2009 dollars; All damage may not have been reported.

Source: National Climatic Data Center

5.6.4 Probability of Future Occurrences

The probability of occurrence for future lightning events in the Toe River Region is high. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), the Toe River Region is located in an area of the country that experienced an average of 2-4 lightning flashes per square kilometer per year between 1997 and 2007. Given this regular frequency of occurrence, it can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

5.7 SEVERE THUNDERSTORM

5.7.1 Background

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning.⁶ Although thunderstorms generally affect a small area, they are very dangerous may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the “engine” of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun’s heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Further, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as “severe.” A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) Hail of three-quarters of an inch; 2) Tornado; 3) Winds of at least 58 miles per hour.

Thunderstorm events have the capability of producing straight-line winds that can cause severe destruction to communities and threaten the safety of a population. Such wind events, sometimes separate from a thunderstorm event, are common throughout the Toe River Region.

5.7.2 Location and Spatial Extent

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, the Toe River typically experiences several straight-line wind events each year. These wind events can and have caused extensive damage. It is assumed that the Toe River Region has uniform exposure to an event and the spatial extent of an impact would be potentially large.

5.7.3 Historical Occurrences

Severe storms have resulted in four disaster declarations in the Toe River Region in 1973, 1977, 1995, and 1998.⁷ According to NCDC, there have been 223 reported thunderstorm wind events in the Toe River Region since 1950.⁸ These events caused \$7.4 million in damages (2009 dollars). There were no reports of injuries or fatalities. **Table 5.14** summarizes this information. **Table 5.15** presents detailed thunderstorm event reports including date, magnitude, and associated damages for each event.

⁶ Lightning and hail hazards are discussed as separate hazards in this section.

⁷ Not all of the participating counties were declared disaster areas for these storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 3: Community Profile.

⁸ These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional thunderstorm events have occurred in the Toe River Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.14: SUMMARY OF THUNDERSTORM OCCURRENCES IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009 dollars)
Avery County	58	\$1,793,273
Banner Elk	6	\$0
Crossnore	0	\$0
Elk Park	1	\$0
Grandfather Village	0	\$0
Newland	10	\$0
Sugar Mountain	0	\$0
Unincorporated Area	41	\$0
McDowell County	81	\$1,942,434
Marion	18	\$165,842
Old Fort	10	\$4,920
Unincorporated Area	53	\$1,771,672
Mitchell County	48	\$1,840,801
Bakersville	2	\$2,388
Spruce Pine	4	\$0
Unincorporated Area	42	\$1,838,413
Yancey County	36	\$1,876,987
Burnsville	6	\$1,159
Unincorporated Area	31	\$1,875,825
TOE RIVER REGION TOTAL	223	\$7,453,495

Source: National Climatic Data Center

TABLE 5.15: HISTORICAL THUNDERSTORM OCCURRENCES IN THE TOE RIVER REGION

	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Avery County					
Newland	02/22/1993	High Wind	0 kts.	0/0	\$7,770
Avery County and 15 others	10/05/1995	High Winds	0 kts.	0/0	\$1,380,791
Avery County and 11 others	11/11/1995	High Winds	0 kts.	0/0	\$30,674
Avery County and 23 Others	01/18/1996	High Wind	0 kts.	0/0	\$4,468
Roaring Creek	05/07/1999	Tstm Wind	60 kts.	0/0	\$13,439
Avery County and 2 others	03/10/2002	High Wind	50 kts.	0/0	\$1,230
Newland	07/09/2003	Tstm Wind	50 kts.	0/0	\$1,194
Avery County and 15 others	10/14/2003	High Wind	50 kts.	0/0	\$1,343
Avery County and 10 others	11/13/2003	High Wind	50 kts.	0/0	\$2,714
Avery County and	11/18/2003	High Wind	50 kts.	0/0	\$2,218

SECTION 5: HAZARD PROFILES

	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
6 others					
Avery County and 11 others	03/07/2004	High Wind	50 kts.	0/0	\$8,212
Newland	05/26/2004	Tstm Wind	50 kts.	0/0	\$3,478
Avery County and 4 others	09/07/2004	High Wind	50 kts.	0/0	\$76,512
Avery County and 11 others	09/16/2004	High Wind	55 kts.	0/0	\$154,570
Avery County and 15 others	09/17/2004	High Wind	50 kts.	0/0	\$5,434
Avery County and 11 others	04/02/2005	High Wind	60 kts.	0/0	\$65,654
Avery County and 5 others	08/30/2005	High Wind	50 kts.	0/0	\$1,876
Avery County and 6 others	01/25/2006	High Wind	55 kts.	0/0	\$3,216
Avery County and 4 others	04/03/2006	High Wind	50 kts.	0/0	\$4,371
Avery County and 21 others	04/16/2007	High Wind	60 kts.	0/0	\$24,111
McDowell County					
Marion	08/11/1995	Tstm Wind	0 kts.	0/0	\$7,362
McDowell County and 14 others	10/05/1995	High Winds	0 kts.	0/0	\$1,472,372
McDowell County and 11 others	11/11/1995	High Winds	0 kts.	0/0	\$42,944
McDowell County and 23 others	01/18/1996	High Wind	0 kts.	0/0	\$3,415
McDowell County	03/02/1996	High Wind	0 kts.	0/0	\$2,185
Marion	08/04/1997	Tstm Wind	50 kts.	0/0	\$13,976
McDowell County and 6 others	01/07/1998	High Wind	50 kts.	0/0	\$6,881
McDowell County and 15 others	02/24/1998	High Wind	50 kts.	0/0	\$1,720
Marion	05/26/1998	Tstm Wind	50 kts.	0/0	\$27,523
McDowell County and 14 others	03/20/2001	High Wind	55 kts.	0/0	\$60,322
Marion	05/02/2002	Tstm Wind	55 kts.	0/0	\$6,149
Old Fort	06/04/2002	Tstm Wind	50 kts.	0/0	\$3,690
Pleasant Garden	06/04/2002	Tstm Wind	50 kts.	0/0	\$1,230
Old Fort	06/13/2002	Tstm Wind	50 kts.	0/0	\$1,230
Glenwood	05/02/2003	Tstm Wind	70 kts.	0/0	\$29,851
Marion	07/09/2003	Tstm Wind	50 kts.	0/0	\$3,582
McDowell County and 15 others	10/14/2003	High Wind	50 kts.	0/0	\$1,343
McDowell County and 15 others	11/13/2003	High Wind	50 kts.	0/0	\$2,714
McDowell County and 3 others	03/07/2004	High Wind	50 kts.	0/0	\$49,269
Marion	05/23/2004	Tstm Wind	55 kts.	0/0	\$1,159

SECTION 5: HAZARD PROFILES

	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
McDowell County and 4 others	09/16/2004	High Wind	50 kts.	0/0	\$4,637
McDowell County and 15 others	09/17/2004	High Wind	50 kts.	0/0	\$5,434
McDowell County and 11 others	04/02/2005	High Wind	60 kts.	0/0	\$65,655
McDowell County and Macon County	11/21/2005	High Wind	55 kts.	0/0	\$2,814
McDowell County and 9 others	01/14/2006	High Wind	60 kts.	0/0	\$1,093
McDowell County and 6 others	01/25/2006	High Wind	55 kts.	0/0	\$3,122
McDowell County and 4 others	04/03/2006	High Wind	50 kts.	0/0	\$4,371
Marion	08/25/2007	Tstm Wind	55 kts.	0/0	\$106,090
Dysortville	03/04/2008	Tstm Wind	60 kts.	0/0	\$10,300
Mitchell County					
Mitchell County and 11 others	10/05/1995	High Winds	0 kts.	0/0	\$1,472,372
Mitchell County and 11 others	11/11/1995	High Winds	0 kts.	0/0	\$30,674
Mitchell County and 23 others	01/18/1996	High Wind	0 kts.	0/0	\$4,468
Mitchell County and 2 others	03/10/2002	High Wind	50 kts.	0/0	\$1,230
Bakersville	07/09/2003	Tstm Wind	55 kts.	0/0	\$2,388
Mitchell County and 15 others	10/14/2003	High Wind	50 kts.	0/0	\$1,343
Mitchell County and 10 others	11/13/2003	High Wind	50 kts.	0/0	\$2,714
Mitchell County and 6 others	11/18/2003	High Wind	50 kts.	0/0	\$2,218
Mitchell County and 11 others	03/07/2004	High Wind	50 kts.	0/0	\$8,212
Mitchell County and 11 others	09/16/2004	High Wind	55 kts.	0/0	\$154,570
Mitchell County and 15 others	09/17/2004	High Wind	50 kts.	0/0	\$5,434
Mitchell County and 11 others	04/02/2005	High Wind	60 kts.	0/0	\$65,655
Mitchell County and 6 others	01/25/2006	High Wind	55 kts.	0/0	\$3,122
Mitchell County and 22 others	04/16/2007	High Wind	60 kts.	0/0	\$23,063
Yancey County					
Yancey County and 14 others	10/05/1995	High Winds	0 kts.	0/0	\$1,472,372
Yancey County and 11 others	11/11/1995	High Winds	0 kts.	0/0	\$2,937
Yancey County and 23 others	01/18/1996	High Wind	0 kts.	0/0	\$4,468

	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Burnsville	03/05/1997	Tstm Wind	50 kts.	0/0	\$0
Yancey County and 5 others	02/03/1998	High Wind	0 kts.	0/0	\$22,936
Bee Log	02/17/1998	Tstm Wind	50 kts.	0/0	\$20,643
Ramseytown	08/20/1999	Tstm Wind	60 kts.	0/0	\$26,878
Yancey County and 20 others	03/20/2001	High Wind	55 kts.	0/0	\$60,322
Yancey County and 15 others	10/14/2003	High Wind	50 kts.	0/0	\$1,343
Yancey County and 10 others	11/13/2003	High Wind	50 kts.	0/0	\$2,714
Yancey County and 11 others	03/07/2004	High Wind	50 kts.	0/0	\$8,212
Burnsville	05/26/2004	Tstm Wind	50 kts.	0/0	
Burnsville	05/31/2004	Tstm Wind	50 kts.	0/0	\$1,159
Yancey County and 9 others	07/05/2004	High Wind	55 kts.	0/0	\$1,159
Yancey County and 11 others	09/16/2004	High Wind	55 kts.	0/0	\$154,570
Yancey County and 15 others	09/17/2004	High Wind	50 kts.	0/0	\$5,434
Yancey County and 11 others	04/02/2005	High Wind	60 kts.	0/0	\$65,655
Yancey County and 6 others	01/25/2006	High Wind	55 kts.	0/0	\$3,122
Yancey County and 22 others	04/16/2007	High Wind	60 kts.	0/0	\$23,063

*Property damage is reported in 2009 dollars; All damage may not have been reported.

Source: National Climatic Data Center

5.7.4 Probability of Future Occurrences

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future.

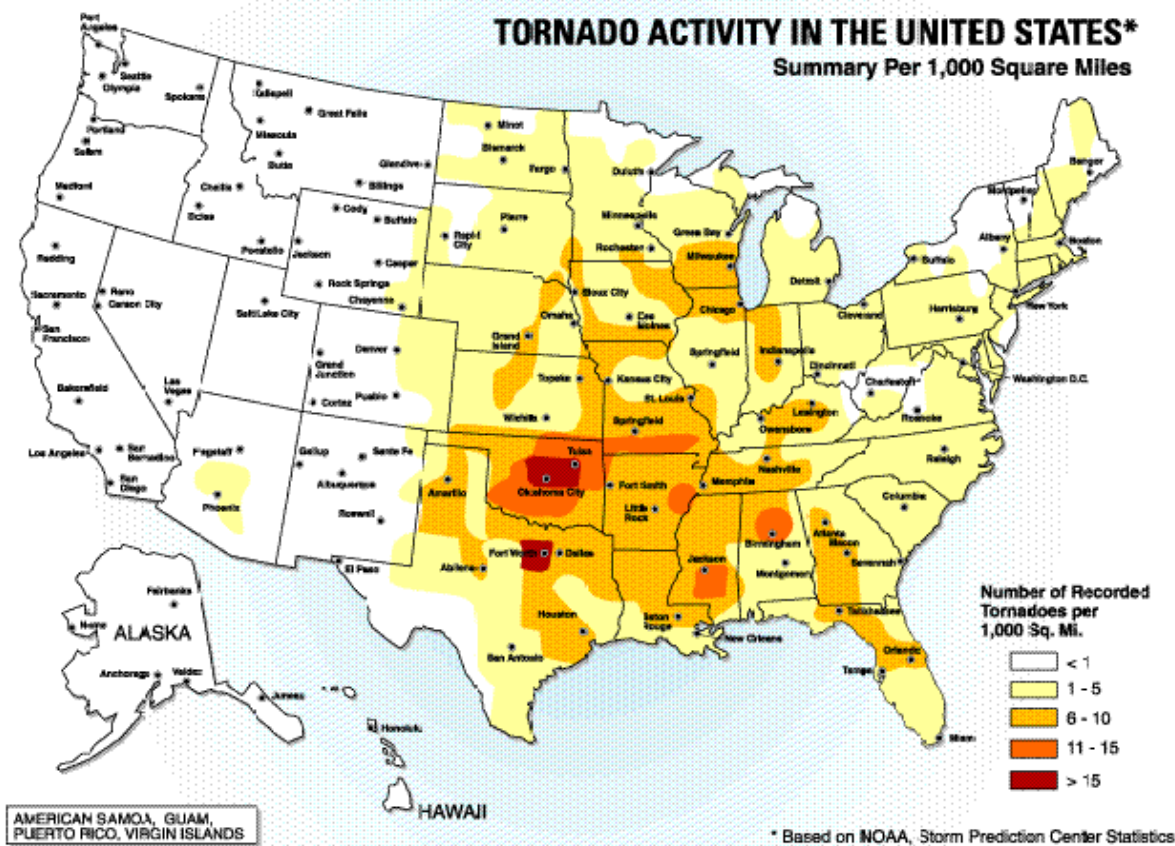
5.8 TORNADO

5.8.1 Background

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.⁹ According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of “tornado alley”), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). **Figure 5.6** shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

FIGURE 5.6: TORNADO ACTIVITY IN THE UNITED STATES



Source: Federal Emergency Management Agency

Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadoic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were

⁹ NOAA, 2009.

determined using the traditional version of the Fujita Scale (**Table 5.16**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.17**).

TABLE 5.16: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-SCALE NUMBER	INTENSITY	WIND SPEED	TYPE OF DAMAGE DONE
F0	GALE TORNADO	40–72 MPH	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE TORNADO	73–112 MPH	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT TORNADO	113–157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE TORNADO	158–206 MPH	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING TORNADO	207–260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE TORNADO	261–318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	INCONCEIVABLE TORNADO	319–379 MPH	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: National Weather Service

TABLE 5.17 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

EF-SCALE NUMBER	INTENSITY PHRASE	3 SECOND GUST (MPH)	TYPE OF DAMAGE DONE
F0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

5.8.2 Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus the Toe River Region. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that the Toe River Region is uniformly exposed to this hazard.

5.8.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of seven (7) recorded tornado events in the Toe River Region between 1979 and December 2009 (**Table 5.18**), resulting in nearly \$1.8 million in property damages.¹⁰ In addition, one death and one injury were reported (**Table 5.19**). The magnitude of these tornadoes ranges from F0 to F2 in intensity, with approximate touchdown locations for events with known coordinates are shown in **Figure 5.7**. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 58 years.

¹⁰ These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in the Toe River Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.18: SUMMARY OF TORNADO OCCURRENCES IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009)
Avery County	1	\$0
Banner Elk	0	\$0
Crossnore	0	\$0
Elk Park	0	\$0
Grandfather Village	0	\$0
Newland	0	\$0
Sugar Mountain	0	\$0
Unincorporated Area	1	\$177,820
McDowell County	0	\$0
Marion	2	\$28,593
Old Fort	1	\$0
Unincorporated Area	1	\$663,314
Mitchell County	0	\$0
Bakersville	0	\$0
Spruce Pine	0	\$0
Unincorporated Area	0	\$0
Yancey County	2	\$0
Burnsville	0	\$0
Unincorporated Area	2	\$925,954
TOE RIVER REGION TOTAL	6	\$1,795,682

Source: National Climatic Data Center

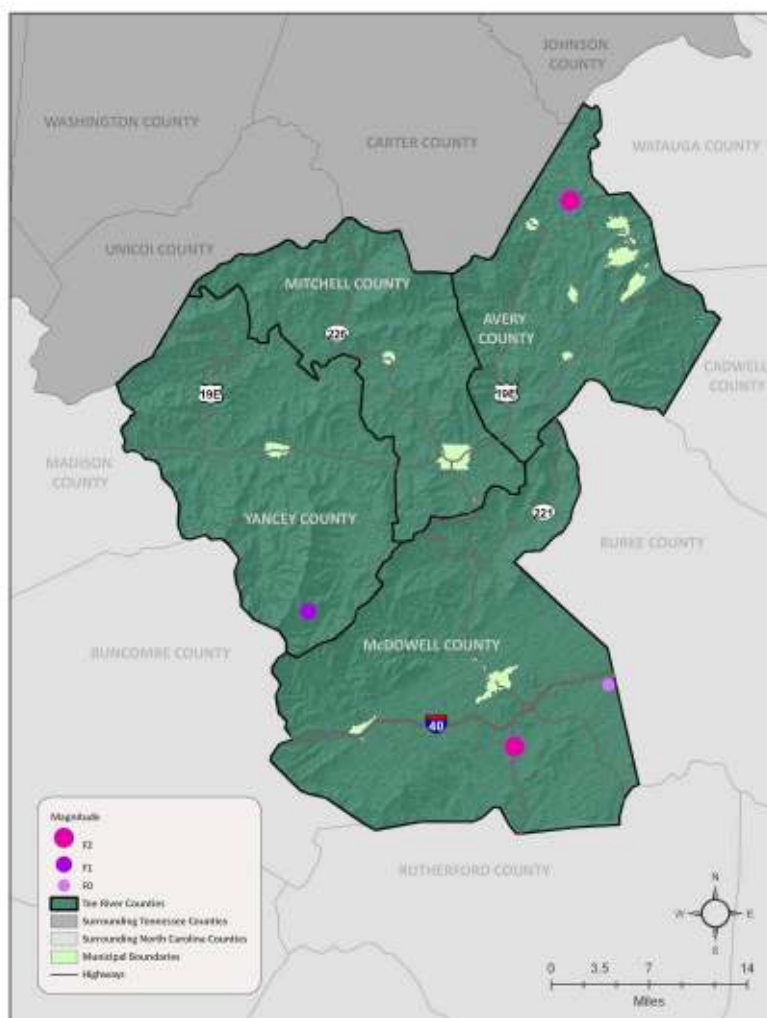
TABLE 5.19: HISTORICAL TORNADO IMPACTS

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Avery County					
Avery County	04/09/1965	F2	0/1	\$177,820	Not Available
McDowell County					
Marion	04/20/1996	F0	0/0	\$28,593	A small tornado briefly touched down south of Marion. The roof was blown off a carport and part of a house was removed, in addition to several downed trees and antennae. A concrete well lid was blown off and carried several hundred yards.
Glenwood	05/07/1998	F2	0/0	\$663,314	Another supercell which tracked across the mountains spawned a tornado that travelled through a portion of Glenwood. Several homes and mobiles sustained damage or were destroyed. The first tornado of the day in western North Carolina occurred in Madison county. A third supercell that emerged out of the mountains in McDowell

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					county produced several tornadoes from the southern part of that county to northern Mecklenburg county. Damage was fairly significant across western North Carolina with numerous homes either damaged or destroyed. Fortunately, no one was killed.
Marion	05/24/2000	F0	0/0	\$0	The most damaging of the supercells developed in northern McDowell county and became severe along the Burke/McDowell county line near Lake James, dropping baseball size hail. This severe storm tracked southeast along the county border, producing golf ball to softball size hail all the way to the Rutherford county line. In addition to the very large hail, this supercell was able to generate a few weak (F0) tornadoes. The first tornado briefly touched down near Bridgewater and blew windows out of a house. It may also have been responsible for wind damage at a nearby mobile home park where 15 to 25 mobile homes sustained damage from both wind and hail. The second tornado developed in extreme eastern McDowell county and blew down trees across Interstate 40 before crossing into Burke county. Several motorists on Interstate 40 sighted the tornado and had their vehicles damaged by softball size hail.
Old Fort	2004		1/0	\$0	This event was reported by during the second mitigation meeting and confirmed by several other members. However, specific information on the event was not found.
Yancey County					
Yancey County	03/08/1956	F1	0/0	\$0	<i>Not Available</i>
Yancey County	06/06/1977	F1	0/0	\$925,954	<i>Not Available</i>

*Property Damage is reported in 2009 dollars.

Source: NCDC

FIGURE 5.7: LOCATIONS OF HISTORICAL TORNADO EVENTS IN THE TOE RIVER REGION

Source: NCDC

5.8.4 Probability of Future Occurrences

The probability of future tornado occurrences affecting the Toe River Region is likely. However, according to historical information, tornado events are not typically an annual occurrence for the region. While the majority of the reported tornado events are small in terms of size, intensity and duration, they do pose a significant threat should the Toe River Region experience a direct tornado strike.

5.9 WINTER STORM AND FREEZE

5.9.1 Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 or more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least three hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera - have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Further, communication and power may be disrupted for days.

5.9.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The Toe River Region is accustomed to severe winter weather conditions, and frequently receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

5.9.3 Historical Occurrences

Winter weather has resulted in three disaster declarations in the Toe River Region. This includes the Blizzard of 1996, a subsequent 1996 winter storm, and a severe ice storm in 2002.¹¹ According to the National Climatic Data Center, there have been a total of 626 recorded winter storm events in

¹¹ Not all of the participating counties were declared disaster areas for these events. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 3: Community Profile.

the Toe River Region since 1993 (**Table 5.20**).¹² These events resulted in over \$39 million (2009 dollars) in damages and two deaths in McDowell County (near Marion). Those events with reported damages and fatalities are presented in **Table 5.21**.¹³

TABLE 5.20: SUMMARY OF WINTER STORM EVENTS IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009)
Avery County	194	\$5,995,731
McDowell County	85	\$21,494,586
Mitchell County	173	\$6,089,681
Yancey County	179	\$6,689,391
TOTAL		

Source: National Climatic Data Center

TABLE 5.21: HISTORICAL WINTER STORM IMPACTS

	Date	Type of Storm	Deaths/Injuries	Property Damage*
Avery County				
Statewide	03/12/1993	Winter Storm	0/0	\$776,996
10 counties including Avery County	12/09/1995	Freezing Rain	0/0	\$2,945
15 counties including Avery County	02/02/1996	Ice Storm	0/0	\$4,765,578
21 counties including Avery County	01/09/1997	Ice Storm	0/0	\$133,105
4 counties including Avery County	02/05/2004	Winter Weather/mix	0/0	\$290
16 counties including Avery County	02/26/2004	Heavy Snow	0/0	\$224,609
6 counties including Avery County	12/15/2005	Ice Storm	0/0	\$42,207
Avery County (countywide) [†]	12/18/2009	Snow – Debris Removal	0/0	\$50,000
TOTAL			0/0	\$5,995,731
McDowell County				
Statewide	3/12/1993	Winter Storm	0/0	\$776,996
10 counties including McDowell County	12/09/1995	Freezing Rain	0/0	\$2,945

¹² These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional winter storm conditions have affected the Toe River Region. In addition, the 626 are reported by county, so many of these storms likely affected all of the counties. The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for each county.

¹³ The dollar amount provided by NCDC is divided by the number of affected to reflect a damage estimate for the county.

SECTION 5: HAZARD PROFILES

	Date	Type of Storm	Deaths/Injuries	Property Damage*
15 counties including McDowell County	02/02/1996	Ice Storm	0/0	\$4,765,578
22 counties including McDowell County	01/09/1997	Ice Storm	0/0	\$127,055
8 counties including McDowell County	12/04/2002	Ice Storm	0/0	\$15,373,423
McDowell County [†]	12/2002	Winter Storm-Debris Removal	0/0	\$28,294
4 counties including McDowell County	01/16/2003	Heavy Snow	2/0	\$0
4 counties including McDowell County	02/06/2004	Ice Storm	0/0	\$3,478
16 counties including McDowell County	02/26/2004	Heavy Snow	0/0	\$224,609
6 counties including McDowell County	12/15/2005	Ice Storm	0/0	\$42,207
McDowell County [†]	12/18/2009	Snow-Debris Removal	0/0	\$150,000
TOTAL			2/0	\$21,494,586
Mitchell County				
Statewide	03/12/1993	Winter Storm	0/0	\$776,996
10 counties including Mitchell County	12/09/1995	Freezing Rain	0/0	\$2,945
15 counties including Mitchell County	02/02/1996	Ice Storm	0/0	\$4,765,578
21 counties including Mitchell County	01/09/1997	Ice Storm	0/0	\$127,055
4 counties including Mitchell County	02/05/2004	Winter Weather/mix	0/0	\$290
16 counties including Mitchell County	02/26/2004	Heavy Snow	0/0	\$224,609
6 counties including Mitchell County	12/15/2005	Ice Storm	0/0	\$42,207
Mitchell County (countywide) [†]	12/18/2009	Winter Storm – Debris Removal	0/0	\$150,000
TOTAL			0/0	\$6,089,681
Yancey County				
Statewide	03/12/1993	Winter Storm	0/0	\$776,996
10 counties including Mitchell County	12/09/1995	Freezing Rain	0/0	\$2,945
15 counties including Yancey County	02/02/1996	Ice Storm	0/0	\$4,765,578
22 counties including Yancey County	01/09/1997	Ice Storm	0/0	\$127,055
16 counties including Yancey County	02/26/2004	Heavy Snow	0/0	\$224,609

	Date	Type of Storm	Deaths/Injuries	Property Damage*
6 counties including Yancey County	12/15/2005	Ice Storm	0/0	\$42,207
Yancey County (countywide) [†]	12/18/2009	Winter Storm – Debris Removal	0/0	\$750,000
TOTAL			0/0	\$6,689,391

*Property Damage is reported in 2009 dollars

[†]These events were reported by North Carolina Department of Transportation.

Source: National Climatic Data Center

5.9.4 Probability of Future Occurrences

Winter storm events will remain a likely occurrence in the Toe River Region, and the probability of future occurrences is certain. According to historical information, the Toe River Region experiences an average of 26 winter storm events each year. Fortunately, large scale property damages and/or threats to human life and safety are rare with these events.

Geologic Hazards

5.10 EARTHQUAKE

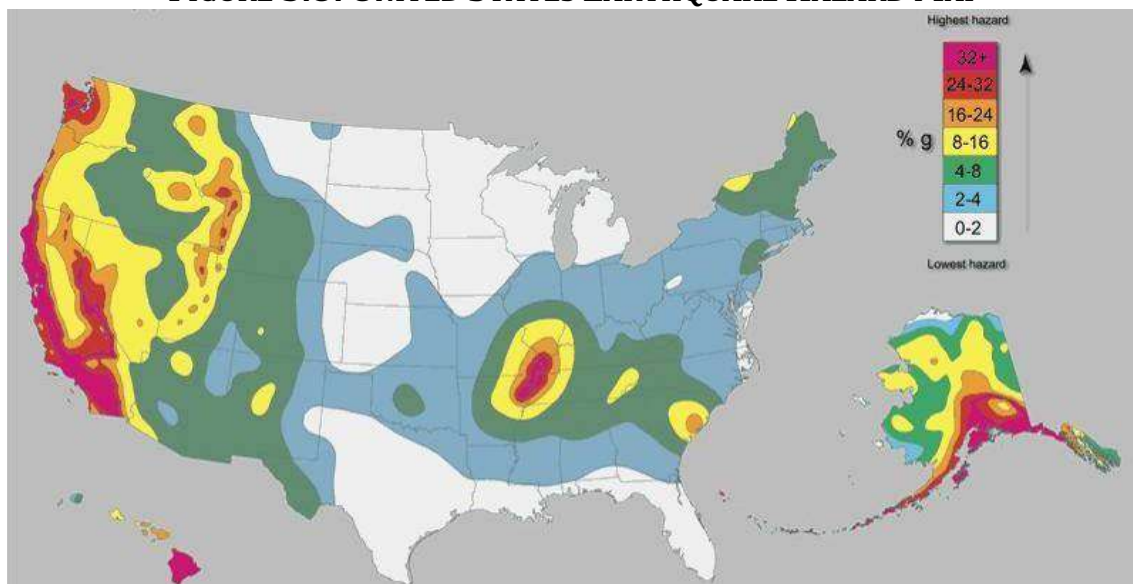
5.10.1 Background

An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.8** shows relative seismic risk for the United States.

FIGURE 5.8: UNITED STATES EARTHQUAKE HAZARD MAP

Source: United States Geological Survey

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.22**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from “I” corresponding to imperceptible (instrumental) events to “XII” for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.23**.

TABLE 5.22: RICHTER SCALE

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

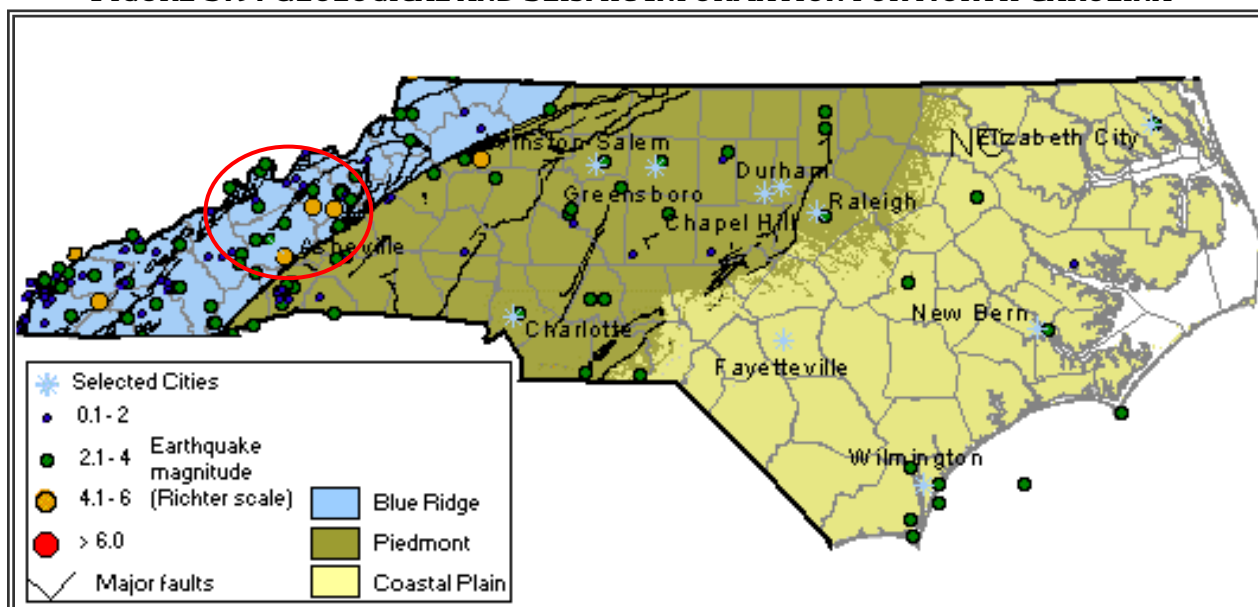
TABLE 5.23: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

5.10.2 Location and Spatial Extent

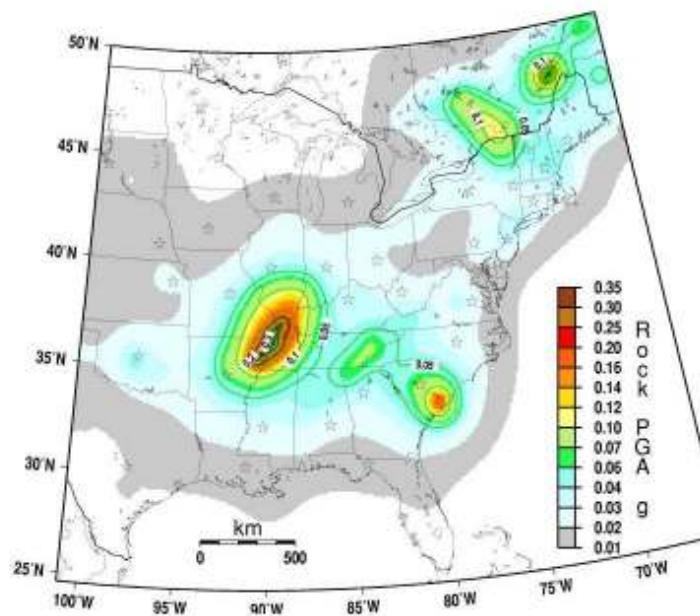
Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.9** is a map showing geological and seismic information for North Carolina.

FIGURE 5.9: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA

Source: North Carolina Geological Survey

Figure 5.10 shows the intensity level associated with the Toe River Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this maps, all of the Toe River Region lies within an approximate zone of level “5” ground acceleration. This indicates that the region as a whole exists within an area of moderate seismic risk.

FIGURE 5.10: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

5.10.3 Historical Occurrences

At least 44 earthquakes are known to have affected the Toe River Region since 1874. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.24** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table 5.25** presents a detailed occurrence of each event including the date, distance for the epicenter, and Modified Mercalli Intensity (if known).¹⁴

TABLE 5.24: SUMMARY OF SEISMIC ACTIVITY IN THE TOE RIVER REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Avery County	9	IV (moderate)	< 4.6
Banner Elk	3	IV	
Crossnore	2	III	
Elk Park	1	IV	
Grandfather Village	0	-	
Newland	2	IV	
Sugar Mountain	0	-	
Unincorporated Area	0	-	
McDowell County	11	V (slightly strong)	< 4.8
Marion	5	V	

¹⁴ Due to reporting mechanisms, not all earthquake events were recorded during this time. Further, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, an a value of “unknown” is reported.

Old Fort	5	V	
Unincorporated Area	1	III	
Mitchell County	6	V (slightly strong)	< 4.8
Bakersville	2	V	
Spruce Pine	3	V	
Unincorporated Area	1	III	
Yancey County	18	VI (strong)	< 5.4
Burnsville	6	V	
Unincorporated Area	12	VI	
TOE RIVER REGION TOTAL	44	VI	< 5.4

Source: National Geophysical Data Center

TABLE 5.25: SIGNIFICANT SEISMIC EVENTS IN THE TOE RIVER REGION (1638 -1985)

Location	Date	Magnitude	MMI	Distance from Epicenter (miles)
Avery County				
Newland	11/3/1928	unknown	III	61
Banner Elk	5/13/1957	unknown	IV	47
Elk Park	5/13/1957	unknown	IV	45
Newland	5/13/1957	unknown	IV	38
Crossnore	1/3/1960	unknown	III	unknown
Newland	9/10/1970	unknown	III	47
Banner Elk	11/30/1973	4.7	IV	192
Crossnore	11/30/1973	1.2	III	184
Banner Elk	7/27/1980	5.1	III	287
McDowell County				
Marion	2/21/1916	unknown	V	48
Marion	5/13/1928	unknown	IV	7
Marion	11/3/1928	unknown	unknown	63
Old Fort	5/13/1957	unknown	IV	21
Unincorporated County	1/3/1960	unknown	III	unknown
Old Fort	11/30/1973	4.7	IV	161
Marion	4/9/1981	3.2	IV	22
Old Fort	4/9/1981	3.2	V	19
Old Fort	4/9/1981	3.2	II	unknown
Marion	5/5/1981	3.5	III	54
Old Fort	3/25/1983	3.3	III	40
Mitchell County				
Bakersville	5/13/1957	unknown	V	33
Bakersville	11/20/1969	4.3	IV	185
Spruce Pine	5/13/1957	unknown	V	20
Spruce Pine	1/20/1964	unknown	IV	unknown

Location	Date	Magnitude	MMI	Distance from Epicenter (miles)
Spruce Pine	11/30/1973	4.7	V	170
Unincorporated County	7/8/1926	unknown	VI	0
Unincorporated County	1/3/1960	unknown	III	unknown
Yancey County				
Mount Mitchell	02/10/1874	unknown	V	18
Mount Mitchell	02/22/1874	unknown	V	18
Mount Mitchell	03/17/1874	unknown	V	18
Mount Mitchell	03/26/1874	unknown	V	18
Mount Mitchell	04/14/1874	unknown	V	18
Mount Mitchell	04/17/1874	unknown	V	18
Burnsville	5/13/1957	unknown	IV	32
Micaville	5/13/1957	unknown	VI	26
Pensacola	5/13/1957	unknown	V	30
Bald Creek	5/13/1957	unknown	III	unknown
Busick	5/13/1957	unknown	V	16
Burnsville	1/20/1964	unknown	IV	unknown
Pensacola	1/20/1964	unknown	IV	unknown
Cane River	1/20/1964	unknown	IV	unknown
Burnsville	7/13/1969	3.5	IV	127
Burnsville	11/20/1969	4.3	V	201
Burnsville	10/9/1971	3.4	III	108
Burnsville	4/9/1981	3.2	V	53
Burnsville	1/20/1964	unknown	IV	unknown

Source: National Geophysical Data Center

In addition to those earthquakes specifically affecting the Toe River Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.26**.

TABLE 5.26: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/07/1812	New Madrid, MO	8.7	XII	VI
04/29/1852	Wytheville, VA	5.0	VI	VI
08/31/1861	Wilkesboro, NC	5.1	VII	VII
12/23/1875	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII

05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913	Union County, SC	4.8	VII	VI
02/21/1916	Asheville, NC	5.5	VII	VII
07/08/1926*	Mitchell County, NC	5.2	VII	VII
11/03/1928	Newport, TN	4.5	VI	VI
05/13/1957	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 **	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI

*This event is accounted for in the Toe River occurrences.

** Conflicting reports on this event, intensity in North Carolina could have been either V or VI

Source: This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERL, Memphis State University (1983).

5.10.4 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Toe River Region is unlikely. However, it is likely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region.

5.11 LANDSLIDE

5.11.1 Background

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or “slurry.” Slurry can flow rapidly down slopes or through channels, and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

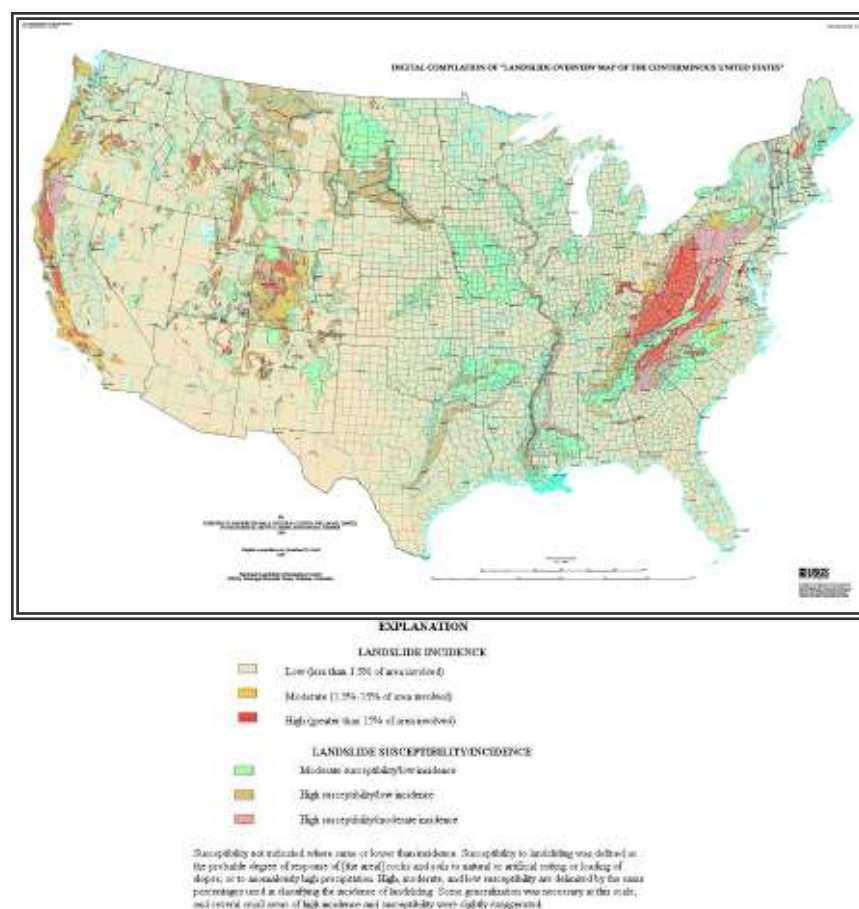
Among the most destructive types of debris flows are those that accompany volcanic eruptions. A spectacular example in the United States was a massive debris flow resulting from the 1980 eruptions of Mount St. Helens, Washington. Areas near the bases of many volcanoes in the Cascade Mountain Range of California, Oregon and Washington are at risk from the same types of flows during future volcanic eruptions.

Areas that are generally prone to landslide hazards include previous landslide areas; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past; relatively flat-lying areas away from sudden changes in slope; and areas at the top or along ridges, set back from the tops of slopes.

According to the United States Geological Survey, each year landslides cause \$5.1 billion (2009 dollars) in damage and between 25 and 50 deaths in the United States.¹⁵ **Figure 4.11** delineates areas where large numbers of landslides have occurred and areas which are susceptible to landsliding in the conterminous United States.¹⁶

¹⁵ United States Geological Survey (USGS). United States Department of the Interior. "Landslide Hazards – A National Threat." 2005.

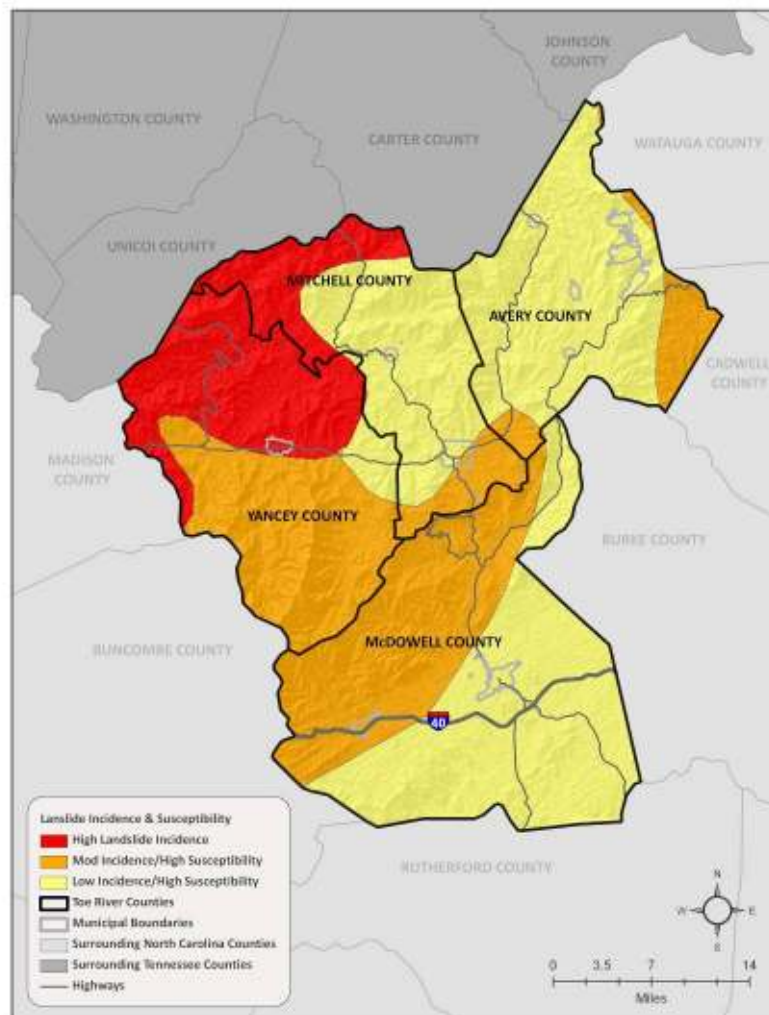
¹⁶ This map layer is provided in the U.S. Geological Survey Professional Paper 1183, Landslide Overview Map of the Conterminous United States, available online at http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html.

FIGURE 5.11: LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES

Source: USGS

5.11.2 Location and Spatial Extent

Landslides are possible throughout the Toe River Region. However, some areas may experience more landslide activities than others. According to **Figure 5.12** below, the northwestern portion of the Region, including Mitchell County and Yancey County, have the greatest landslide activity. A majority of the western portion of the Region has a moderate incidence occurrence rate; a majority of the eastern portion has a low incidence record.

FIGURE 5.12: LANDSLIDE SUSCEPTIBILITY MAP OF THE TOE RIVER REGION

Source: USGS

5.11.3 Historical Occurrences

Table 5.27 presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey¹⁷. **Table 5.28** presents damage estimates of recent slide events provided by the North Carolina Department of Transportation. The locations of the landslide events presented in the aforementioned tables are presented in **Figure 5.13**.

¹⁷ It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences. Further, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

TABLE 5.27: SUMMARY OF LANDSLIDE ACTIVITY IN THE TOE RIVER REGION

LOCATION	NUMBER OF OCCURRENCES
Avery County	55
Banner Elk	0
Crossnore	0
Elk Park	10
Grandfather Village	0
Newland	0
Sugar Mountain	0
Unincorporated Area	45
McDowell County	42
Marion	1
Old Fort	11
Unincorporated Area	30
Mitchell County	51
Bakersville	29
Spruce Pine	10
Unincorporated Area	12
Yancey County	24
Burnsville	6
Unincorporated Area	18
TOE RIVER REGION TOTAL	172

Source: North Carolina Geological Survey

The North Carolina Department of Transportation provided damage estimates for several recent landslide occurrences in the Toe River Region. The higher damages associated with Yancey County are reflective of the information provided in the USGS Landslide Susceptibility Map (Figure 5.12, above). This data is used to determine an annualized loss estimate, which is presented in Section 6: Vulnerability Assessment.

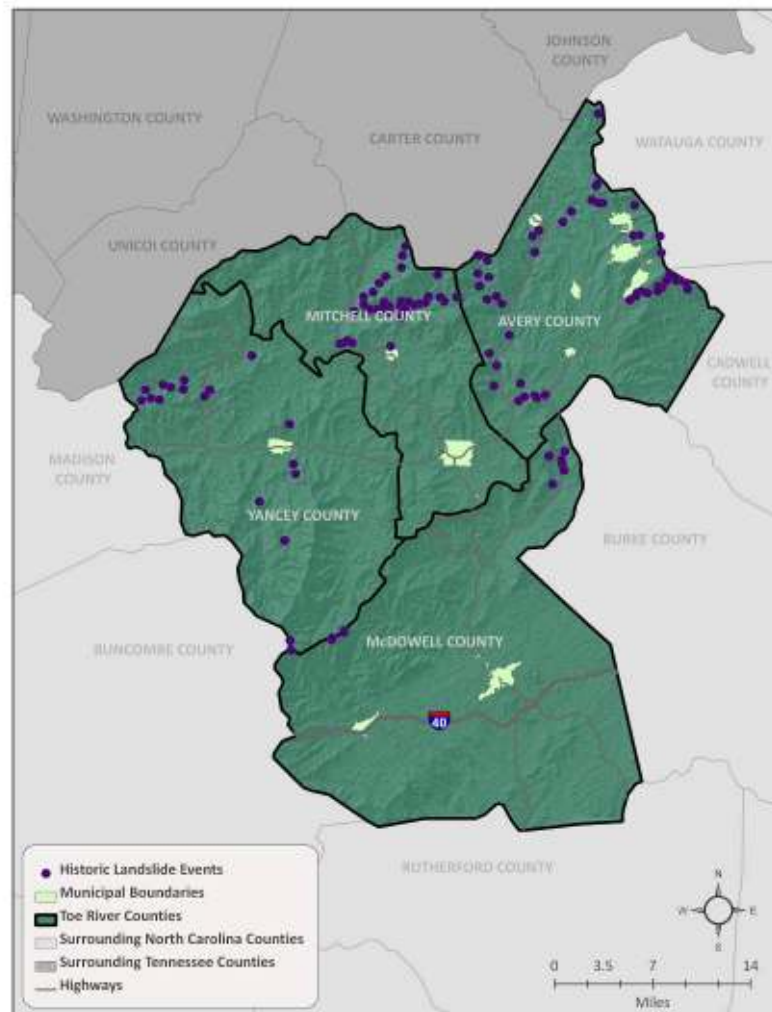
TABLE 5.28: RECENT LANDSLIDE ACTIVITY WITH ASSOCIATED DAMAGES

LOCATION	DATE	DAMAGE (2009 DOLLARS)
Avery County		
US 221	01/1998	\$18,537
McDowell County		
SR 1407	12/2002	\$76,138
Mitchell County		
US 19E	01/1998	\$20,556
Yancey County		
US 19	01/1998	\$5,104
US 80	01/1998	\$7,258
Countywide (40-50 small slides/slope failures)	12/18/2009	\$200,000
US 19W	12/18/2009	\$75,000

TOE RIVER REGION TOTAL

\$402,593

Source: North Carolina Department of Transportation

FIGURE 5.13: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES

Source: North Carolina Geological Survey

5.11.4 Probability of Future Occurrences

Based on historical information and the USGS susceptibility index, the probability of future landslide events is highly likely. Although not all years are reported for previous landslide events, using the earliest date reported (1976), results in an average of 5 landslides per year in the Toe River Region. It should also be noted that some areas in the Toe River Region have greater risk than others. Further, the McDowell County Subdivision Ordinance limits the steepness of roads, specifically to reduce the risk of landslides.

Hydrologic Hazards

5.12 DAM AND LEVEE FAILURE

5.12.1 Background

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation and maintenance.

There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. If a levee breaks, scores of properties may become submerged in floodwaters and residents may become trapped by rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way.

5.12.2 Location and Spatial Extent

The North Carolina Division of Land Resources provides information on dams including a hazard potential classification. There are three hazard classifications- high, intermediate, and low- that correspond to qualitative descriptions and quantitative guidelines. **Table 5.29** explains these classifications.

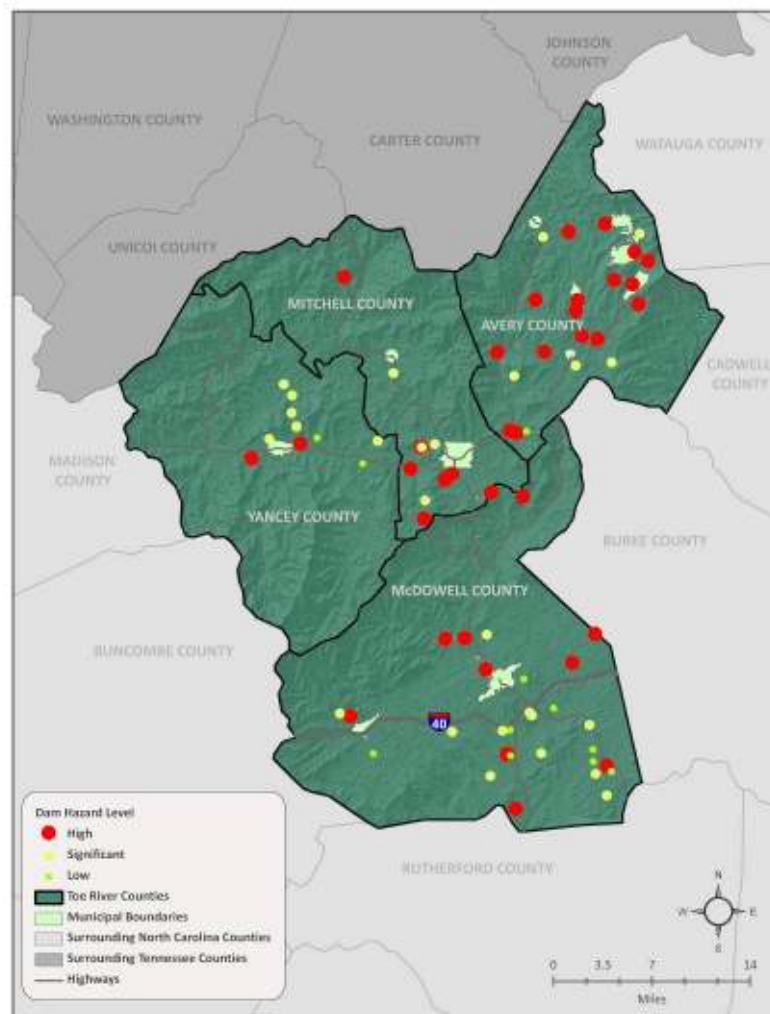
TABLE 5.29: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads	Less than 25 vehicles per day
	Economic damage	Less than \$30,000
Intermediate	Damage to highways, Interruption of service	25 to less than 250 vehicles per day
	Economic damage	\$30,000 to less than \$200,000
High	Loss of human life*	Probable loss of 1 or more human lives
	Economic damage	More than \$200,000
	*Probable loss of human life due to breached roadway or bridge on or below the dam.	250 or more vehicles per day

Source: North Carolina Division of Land Resources

According to the North Carolina Division of Land Management, there are seventy-seven (77) dams in the Toe River Region. Figure 5.14 shows the dam location and the corresponding hazard ranking for each. Of these dams, forty (40) are classified as high hazard potential. These high hazard dams are listed in Table 5.30. According to a consensus of local government officials and the Mitigation Advisory Committee, there is an extremely low possibility that any of these state-recognized dams would cause any damage whatsoever should a dam breach or failure occur, despite the hazard classifications assigned to these dams by the state.

FIGURE 5.14: TOE RIVER REGION DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources

TABLE 5.30: TOE RIVER REGION HIGH HAZARD DAMS

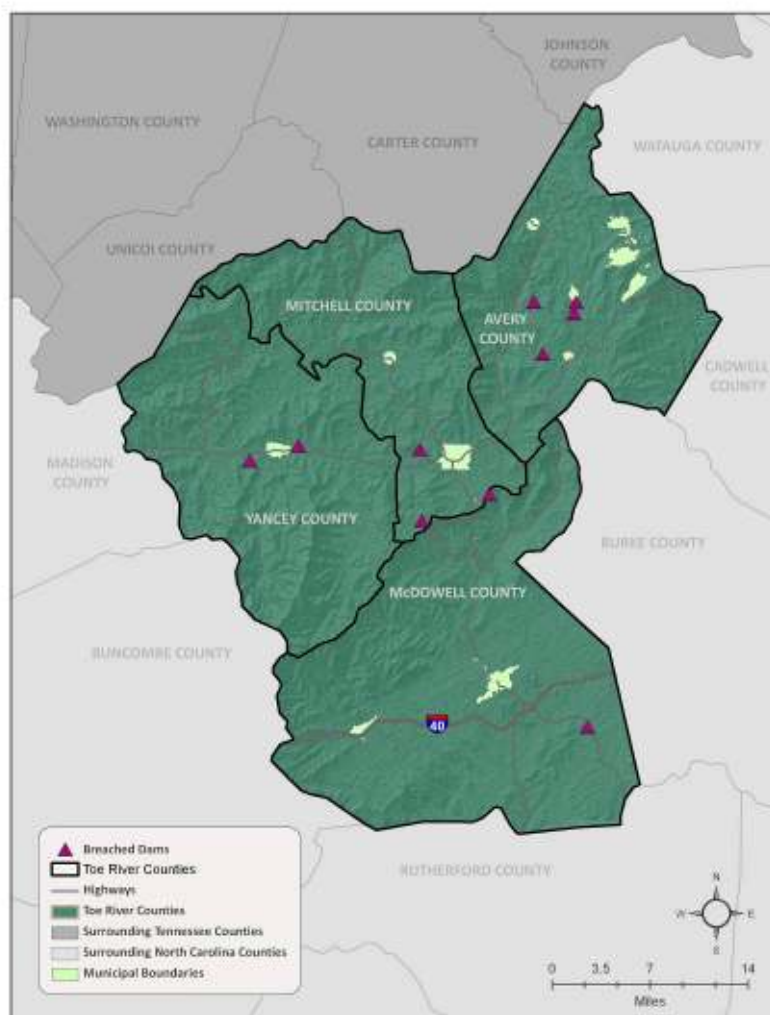
	Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	State Regulated?
Avery County					
	INVER LOCHY DAM	High	3.00	75.00	yes
	BRUSHY CREEK #8	High	10.00	150.00	yes
	GRANDMOTHER DAM	High	38.00	800.00	yes
	GRANDFATHER MTN (LOCH DORNIE)	High	26.90	625.00	yes
	LAND HARBORS DAM	High	150.00	900.00	yes
	BELVUE POND DAM (BREACHED)	High	0.00	0.00	yes
	LINDECAMP POND DAM	High	0.90	6.00	yes
	WEATHERMAN DAM	High	1.00	10.00	yes
	BRUSHY CREEK #7	High	21.00	246.00	yes
	BRUSHY CREEK 6B	High	3.00	42.00	yes
	BRUSHY CREEK 6A	High	3.70	47.00	yes
	TRIANGLE (SECREST)DAM	High	1.00	10.00	yes
	JOHNSON DAM	High	1.50	18.00	yes
	KNIGHT POND DAM (BREACHED)	High	1.00	10.00	yes
	LINVILLE RIDGE DAM	High	1.50	24.00	yes
	WILDCAT LAKE DAM	High	0.00	202.00	yes
	SUGAR MTN DAM (SNOW LAKE)	High	0.70	11.00	yes
	SNYDER POND DAM (BREACHED)	High	0.00	0.00	yes
	RHONEY VIEW POND DAM (BREACHED)	High	0.00	0.00	yes
McDowell County					
	LADY MARION DAM	High	8.00	90.00	yes
	CATAWBA DAM (DUKE FERC)	High	0.00	265182.00	no
	PHILLIPS LAKE	High	40.00	800.00	yes
	2ND BROAD RIVER W.S. #11-15 (BREVARD-ROSS)	High	1.25	38.50	yes
	CAMP GRIER DAM	High	3.00	27.00	yes
	MUDDY CREEK - B. S. A.	High	20.00	440.00	yes
	MUDDY CREEK #8	High	7.00	250.00	yes
	2ND BROAD RIVER W.S. #11-17(BREVARD)	High	1.50	48.10	yes
	LAKE TAHOMA	High	163.00	0.00	no
Mitchell County					

	SPRUCE PINE WATER SUPPLY #1	High	2.00	50.00	yes
	COTTON DAM	High	0.75	8.00	yes
	STRAWBERRY RIDGE (BREACHED)	High	2.00	32.00	yes
	LOWERY POND	High	2.00	20.00	yes
	PHILLIPS POND (BREACHED)	High	0.00	0.00	yes
	SWISS PINE LAKE	High	10.00	124.00	yes
	SPRUCE PINE WATER SUPPLY #2	High	2.00	22.00	yes
	EMERALD LAKE DAM (BREACHED)	High	0.00	0.00	yes
	ALTAPASS DAM	High	2.00	20.00	yes
	BILL BUCKNER DAM	High	2.00	25.00	yes
	AYERS POND DAM (BREACHED)	High	2.00	50.00	yes
	CANE RIVER DAM (BREACHED)	High	0.75	8.00	yes
Yancey County					
	AYERS POND DAM (BREACHED)	High	0.00	0.00	yes
	CANE RIVER DAM (BREACHED)	High	0.00	0.00	yes

Source: North Carolina Division of Land Resources

5.12.3 Historical Occurrences

According to information from the North Carolina Division of Land Management, a total of 11 dams have been breached in the Toe River Region. Avery County has sustained four dam breaches. In McDowell, one dam has been breached. Mitchell County has had four dams breach, and Yancey County has had two dams breach. There are no reports of death, injury, or property damage with any of these events. Further, there are no known levees in the Toe River counties. **Figure 5.15** shows the location of previously breached dams in the Toe River Region.

FIGURE 5.15: HISTORICAL DAM BREACHES IN THE TOE RIVER REGION

Source: North Carolina Division of Land Management

5.12.4 Probability of Future Occurrence

Given dams in the dams and historic data, a dam breach is possible in the future. However, with regular monitoring, these events can be prevented as has been demonstrated in the past.

5.13 EROSION

5.13.1 Background

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such as hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography, climate, or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

5.13.2 Location and Spatial Extent

Erosion in the Toe River Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is composed mainly of fine grained particles such as sand, Toe River soils have a much greater organic matter content. Further, extensive vegetation also helps to prevent erosion in the area.

5.13.3 Historical Occurrences

Although erosion occurs in the Toe River Region, it is not an extreme threat to any of the counties. However, some areas of concern have been reported.

Avery County:

Jerry's Creek and Roaring Creek Stream Beds (1998)

- Flash Flooding

Other areas of concern

- Banner Elk: Dobbins Road
- Newland: River-front Areas
- Freedom Trail Elementary School and Cranberry Middle School
 - Bank Stabilization

McDowell County:

No areas of concern

Mitchell County:

No areas of concern

Yancey County:

No areas of concern

5.13.4 Probability of Future Occurrences

Erosion remains a natural, dynamic and continuous process for the Toe River Region, and its probability of future occurrence is certain. However, given the lack of historical events and threat to life or property, no further analysis will be done in Section 6: *Vulnerability Assessment*.

5.14 FLOOD

5.14.1 Background

Flooding is the most frequent and costly natural hazard in the United States; a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation, and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave action; and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surface.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves and heavy rainfall produced by hurricanes, tropical storms and other large coastal storms.¹⁸ Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

¹⁸ While briefly mentioned here, coastal flooding is more thoroughly addressed under the “storm surge” hazard.

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall, or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

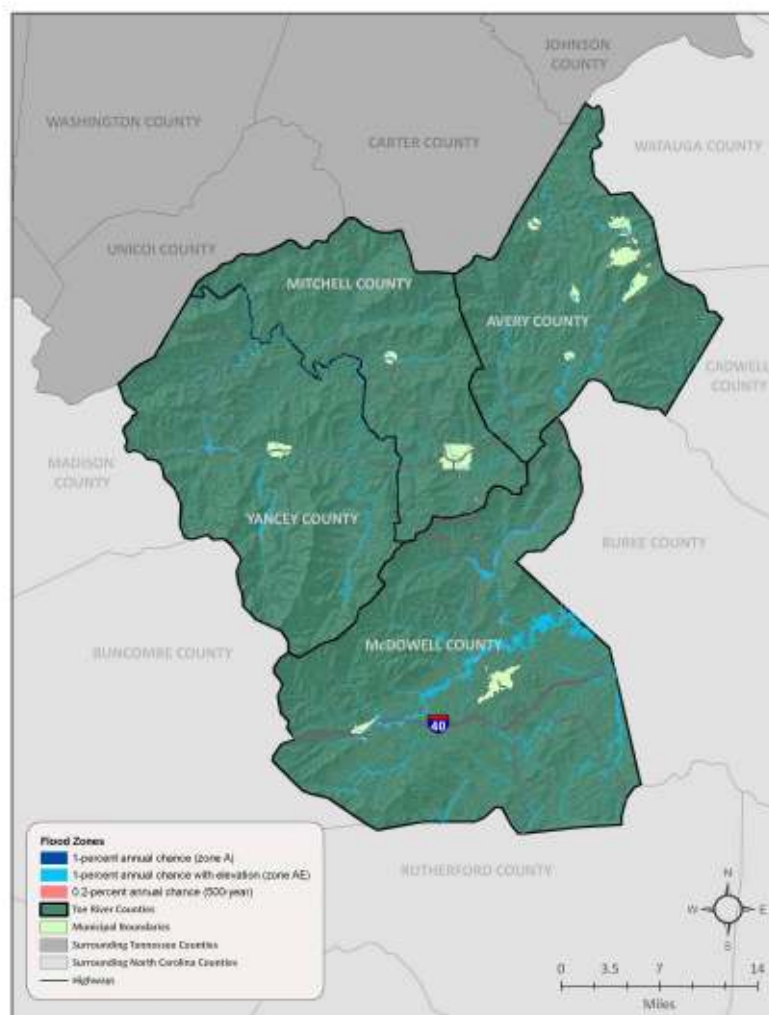
The periodic flooding of lands adjacent to rivers, streams and shorelines (land known as floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood, and the 100-year floodplain by the 100-year flood. Flood frequencies such as the 100-year flood are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year, and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.14.2 Location and Spatial Extent

There are areas in the Toe River Region that are susceptible to flood event. Special flood areas in the Toe River Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). **Figure 5.16** illustrates the location and extent of currently mapped special flood hazard areas for the Toe River Region based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.¹⁹ This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 1,219 square miles that make up the Toe River Region (including the area of Avery County, McDowell County, Mitchell County, and Yancey County), there are 0.325 square miles of land in zone A (1-percent annual chance floodplain), 37.815 square miles of land in zone AE (1-percent annual chance with elevation), and 2.506 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). These flood zone values account for 0.03 percent of the total land area in the Toe River Region. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas.

¹⁹ The county-level DFIRM data used for the Toe River Region was last updated in 2008.

FIGURE 5.16: SPECIAL FLOOD HAZARD AREAS IN THE TOE RIVER REGION

Source: Federal Emergency Management Agency

5.14.3 Historical Occurrences

Information from the National Climatic Data Center was used to ascertain historical flood events. The National Climatic Data Center reported a total of fifty-six (56) events throughout the Toe River Region since March 1993.²⁰ A of these events is presented in **Table 5.31**. These events accounted for over \$40 million (2009 dollars) in property damage due to flood events throughout the region.²¹ Specific information on flood events for each county including date, type of flooding, and deaths and injuries, can be found in **Table 5.32**.

²⁰ These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.

²¹ The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

TABLE 5.31: SUMMARY OF FLOOD OCCURRENCES IN THE TOE RIVER REGION

Location	Number of Occurrences	Property Damage (2009)
Avery County	18	\$14,545,787
Banner Elk	0	\$0
Crossnore	0	\$0
Elk Park	1	\$0
Grandfather Village	0	\$0
Newland	2	\$115,927
Sugar Mountain	0	\$0
Unincorporated Area	15	\$14,429,860
McDowell County	18	\$7,132,968
Marion	2	\$0
Old Fort	0	\$0
Unincorporated Area	16	\$7,132,968
Mitchell County	21	\$13,764,304
Bakersville	3	\$6,892,445
Spruce Pine	2	\$0
Unincorporated Area	16	\$6,871,860
Yancey County	21	\$5,756,182
Burnsville	3	\$45,020
Unincorporated Area	18	\$5,711,162
TOE RIVER REGION TOTAL	61	\$41,244,261

Source: National Climatic Data Center

TABLE 5.32: HISTORICAL FLOOD EVENTS IN THE TOE RIVER REGION

	Date	Type	Deaths/Injuries	Property Damage*
Avery County				
Avery County	03/23/1993	Flash Floods	0/0	\$0
Avery County	01/18/1996	Flood	0/0	\$0
Avery County	01/19/1996	Flood	0/0	\$0
Avery County	11/08/1996	Flash Flood	0/0	\$0
Avery County	01/07/1998	Flood	0/0	\$0
Plumtree	01/07/1998	Flash Flood	0/0	\$7,568,937
Avery County	01/08/1998	Flood	0/0	\$0
Avery County	02/17/1998	Flood	0/0	\$0
Avery County	07/02/2002	Flash Flood	0/0	\$0
Elk Park	02/22/2003	Flash Flood	0/0	\$0
Avery County	11/19/2003	Flood	0/0	\$119,405
Newland	06/12/2004	Flash Flood	0/0	\$0
Linville	09/01/2004	Flash Flood	0/0	\$115,927
Avery County	09/07/2004	Flood	0/0	\$4,830,309
Avery County	09/17/2004	Flood	0/0	\$1,901,209
Newland	07/26/2007	Flash Flood	0/0	\$0
Minneapolis	05/15/2009	Flash Flood	0/0	\$0
Cranberry	05/16/2009	Flash Flood	0/0	\$10,000

SECTION 5: HAZARD PROFILES

	Date	Type	Deaths/Injuries	Property Damage*
McDowell County				
McDowell County	03/23/1993	Flash Floods	0/0	\$0
Central	05/04/1993	Flash Flood	0/0	\$0
McDowell	03/08/1995	Flash Flood	0/0	\$0
McDowell County	01/26/1996	Flood	0/0	\$2,859
Woodlawn	08/12/1996	Flash Flood	0/0	\$0
McDowell County	01/07/1998	Flood	0/0	\$34,404
McDowell County	04/10/2003	Flood	0/0	\$119,405
McDowell County	04/18/2003	Flood	0/0	\$238,810
Nebo	06/15/2003	Flash Flood	0/0	\$0
Marion	07/12/2003	Flash Flood	0/0	\$0
McDowell County	07/12/2003	Flood	0/0	\$0
Sugar Hill	07/30/2003	Flash Flood	0/0	\$0
McDowell County	11/19/2003	Flood	0/0	\$5,970
McDowell County	09/07/2004	Flood	0/0	\$4,830,309
McDowell County	09/17/2004	Flood	0/0	\$1,901,209
Marion	07/18/2005	Flash Flood	0/0	\$0
Nebo	08/18/2005	Flash Flood	0/0	\$0
Davistown	08/26/2008	Flash Flood	0/0	\$0
Mitchell County				
Mitchell County	03/23/1993	Flash Floods	0/0	\$0
Guilford	07/16/1995	Flash Flood	0/0	\$0
Mitchell County	01/18/1996	Flood	0/0	\$0
Mitchell County	01/19/1996	Flood	0/0	\$0
Buladean	08/03/1996	Flash Flood	0/0	\$0
Bakersville	01/07/1998	Flash Flood	0/0	\$6,880,852
Mitchell County	02/03/1998	Flood	0/0	\$0
Mitchell County	02/17/1998	Flood	0/0	\$0
Mitchell County [†]	12/1998	Flood/washouts	0/0	\$118,040
Mitchell County [†]	12/1998	Flood/washout	0/0	\$10,361
Mitchell County	05/24/2000	Flash Flood	0/0	\$0
Bakersville	02/22/2003	Flash Flood	0/0	\$0
Buladean	08/23/2003	Flash Flood	0/0	\$0
Mitchell County	11/19/2003	Flood	0/0	\$0
Mitchell County	11/19/2003	Flood	0/0	\$11,941
Bakersville	09/02/2004	Flash Flood	0/0	\$11,593
Mitchell County	09/07/2004	Flood	0/0	\$4,830,309
Mitchell County	09/17/2004	Flood	0/0	\$1,901,209
Spurce Pine	07/18/2005	Flash Flood	0/0	\$0
Spruce Pine	06/14/2008	Flash Flood	0/0	\$0
Yancey County				
Yancey County	03/23/1993	Flash Floods	0/0	\$0
Burnsville	06/09/1995	Flash Flood	0/0	\$0
Yancey County	10/05/1995	Flash Flood	0/0	\$0
Yancey County	01/26/1996	Flood	0/0	\$2,859
Yancey County	01/07/1998	Flash Flood	0/0	\$275,234

	Date	Type	Deaths/Injuries	Property Damage*
Yancey County	01/08/1998	Flood	0/0	\$0
Celo	06/28/2001	Flash Flood	0/0	\$0
Yancey County	01/23/2002	Flash Flood	0/0	\$0
Burnsville	02/22/2003	Flash Flood	0/0	\$0
Yancey County	07/05/2003	Flash Flood	0/0	\$119,405
Pensacola	07/22/2003	Flash Flood	0/0	\$0
Yancey County	11/19/2003	Flood	0/0	\$0
Yancey County	09/07/2004	Flood	0/0	\$4,830,309
Yancey County	09/17/2004	Flood	0/0	\$231,855
Yancey County	09/28/2004	Flood	0/0	\$0
Celo	07/11/2005	Flash Flood	0/0	\$0
Burnsville	07/19/2005	Flash Flood	0/0	\$45,020
Yancey County	08/30/2005	Flood	0/0	\$0
Windom	08/26/2008	Flash Flood	0/0	\$51,500
Yancey County (SR 1314) [†]	12/18/2009	Road Loss/Pipe Failure	0/0	\$200,000

[†]These events were reported by the North Carolina Department of Transportation.

Source: National Climatic Data Center

5.14.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of December 2009, there have been more than 236 flood losses reported in the Toe River through the National Flood Insurance Program (NFIP) since 1970, totaling over \$4.6 million in claims payments. A summary of these figures for each Toe River county is provided in **Table 5.33**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood losses in the Toe River Region were either uninsured, denied claims payment, or not reported.

TABLE 5.33: SUMMARY OF INSURED FLOOD LOSSES IN THE TOE RIVER REGION

Location	Flood Losses	Claims Payments
Avery County		
Banner Elk	8	\$85,397
Crossnore	4	\$34,481
Elk Park	2	\$2,487
Grandfather Village*	*	*
Newland	11	\$593,000
Sugar Mountain**	n/a	n/a
Unincorporated Area	104	\$2,033,699
<i>County Total</i>	<i>129</i>	<i>\$2,749,064</i>
McDowell County		
Marion	3	\$56,414
Old Fort	2	\$2,942
Unincorporated Area	31	\$501,231
<i>County Total</i>	<i>36</i>	<i>\$560,587</i>
Mitchell County		

Location	Flood Losses	Claims Payments
Bakersville	10	\$193,480
Spruce Pine	9	\$291,600
Unincorporated Area	11	\$302,957
<i>County Total</i>	<i>30</i>	<i>\$788,037</i>
Yancey County		
Burnsville	4	\$70,736
Unincorporated Area	40	\$571,208
<i>County Total</i>	<i>44</i>	<i>\$647,944</i>
TOTAL	236	\$4,683,218

*These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.

**This community is new to the NFIP and no summary statistics had been provided at the time this information was collected.

Source: FEMA, NFIP

5.14.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 122,000 repetitive loss properties nationwide.

Currently (as of December 2009), there are 18 non-mitigated repetitive loss properties located in the Toe River Region, which accounted for 48 losses and more than \$777,500 in claims payments under the NFIP. The average claim amount for these properties is \$19,554. Most of these properties (13) are single family residential and the remaining five (5) are commercial or government-owned buildings. Without mitigation, these properties will likely continue to experience flood losses.

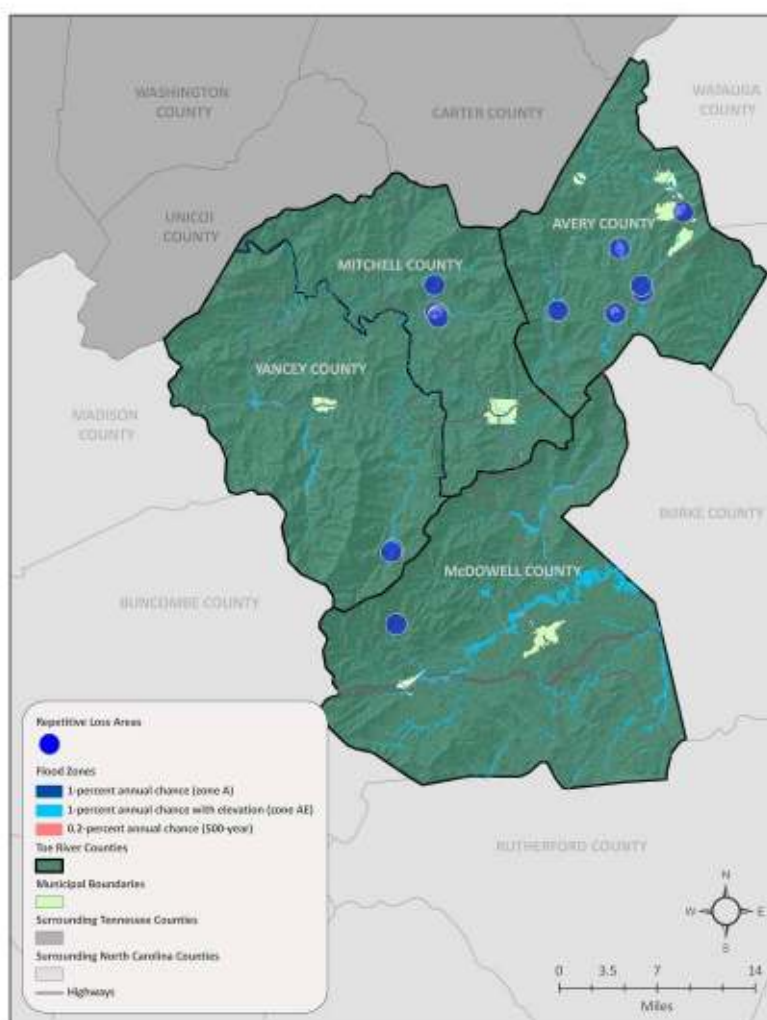
Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Avery County							
Crossnore	1	1 single family	2	\$8,912	-	\$8,912	\$4,456
Unincorporated Area	8	7 single family, 1 non-residential	17	\$147,656	\$30,445	\$178,101	\$10,476
Total	9		19	\$156,568	\$30,445	\$187,014	\$14,933
McDowell County							
Unincorporated Area	1	1 single family	2	\$59,316	\$6,494	\$65,811	\$32,905
Mitchell County							
Bakersville	2	2 non-residential	7	\$122,406	\$61,842	\$184,248	\$26,321
Spruce Pine	1	1 single family	2	\$19,983	\$7,472	\$27,455	\$13,727
Unincorporated Area	3	2 non-residential, 1 single	6	\$170,690	\$64,284	\$234,975	\$39,162

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
		family					
Total	6		15	\$313,080	\$133,599	\$446,679	\$79,211
Yancey County							
Unincorporated Area	2	2 single family	8	\$58,348	\$19,730	\$78,079	\$9,759
Total	18		44	\$587,315	\$190,268	\$777,583	19,554

Source: National Flood Insurance Program

As shown on the repetitive loss properties map below (**Figure 5.17**), repetitive loss areas are generally clustered together (Avery County) and occasionally are more isolated (McDowell County). In both scenarios, the repetitive loss properties are near flood zones as define by FEMA's DFIRM maps (2008).

FIGURE 5.17: REPETITIVE LOSS AREAS IN THE TOE RIVER REGION



Source: FEMA

5.14.6 Probability of Future Occurrences

Flood events will remain a threat in the Toe River Region, and the probability of future occurrences is certain. The probability of future flood events based on magnitude and according to best available data is illustrated in Figure 5.17 above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

Other Hazards

5.15 HAZARDOUS MATERIALS INCIDENTS

5.15.1 Background

Hazardous materials can be found in many forms and quantities that can potentially cause death, serious injury, long-lasting health effects and damage to buildings, homes and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents and 266 are due to other causes.²² In essence, HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes and earthquakes, which in addition to causing incidents can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills and a variety of other environmental pollutants that caused widespread toxicological concern.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping

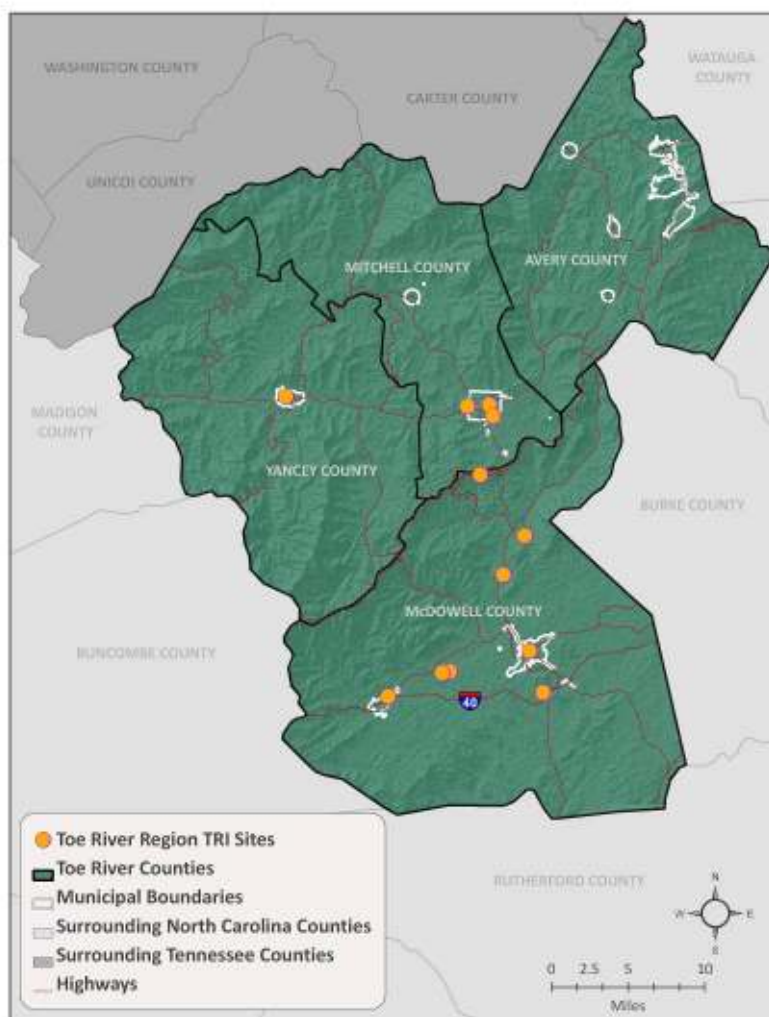
²² FEMA, 1997.

station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

5.15.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collection information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The Toe River Region has 10 TRI sites. In addition, there are two Unimin Corporation sites that the TRRHM included in the analysis due to the presence of hydrochloric acid. These sites are shown in **Figure 5.18**.

FIGURE 5.18: TOXIC RELEASE INVENTORY (TRI) SITES IN THE TOE RIVER REGION



Source: EPA

5.15.3 Historical Occurrences

The county and town officials in the Toe River Region were unaware of any historical hazardous materials events.

5.15.4 Probability of Future Occurrence

Given the location of ten toxic release inventory sites and two recorded Unimin sites in the Toe River Region, it is possible that a hazardous material incident may occur. Official noted that Unimin mobile transport is of particular in Old Fort on Highway 221. County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring.

5.16 TERROR THREAT

5.16.1 Background

Terrorism is defined by FEMA as, “the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom.” Certain facilities are at greater risk than others to a terrorist attack. A high-risk target is defined by FEMA as military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists may also target large public gatherings, water and food supplies, and utilities.

Acts of terror may include assassinations and armed attacks, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons. Each act of terror is described below²³:

Assassinations/Armed Attack:

Tactical assault or sniping from a remote location.

Kidnapping:

Capturing a person or persons against their will and holding them in false imprisonment, often for ransom.

Hijacking:

Robbing or seizing control of a vehicle by use of force.

Bomb Scares and Bombing:

A bombing is the result of a detonation of any material that will cause injury, death, or property damage. A bomb scare involves the verbal or written threat to detonate a bomb.

Cyber Attack:

This refers to the electronic attack using one computer system against another.

Chemical Agent:

Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles or containers; or munitions.

Biological Agent:

²³ Much of this information comes from the FEMA State and Local Mitigation Planning How-to Guide: Integrating Manmade Hazards.

Liquid or solid toxic contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.

Nuclear Bomb:

A nuclear device may be detonated underground, at the surface, in the air or at high altitude.

Radiological Agent:

Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.

The United States Department of Homeland Security posts terror threat levels corresponding to a certain color. This warning system is shown in **Table 5.34**.

TABLE 5.34: HOMELAND SECURITY ADVISORY SYSTEM

Threat Level	Description	Federal Government Agency Response
SEVERE	Severe Risk of Terrorist Attacks	Under a Severe threat level, personnel will be increased or redirected to address emergency needs, specially trained teams will be pre-positioned as needed, transportations systems are to be monitored, redirected, and/or constrained, and public and government facilities may be closed.
HIGH	High Risk of Terrorist Attacks	A High threat level requires coordinating efforts between Federal, State, and local law enforcement agencies, taking additional precautions at public events (including alternate venues and cancellation), restricting threatened facilities to essential personnel only, and preparing to execute contingency procedures if necessary.
ELEVATED	Significant Risk of Terrorist Attacks	In Elevated situations, agencies should increase surveillance of critical places, coordinate emergency plans with neighboring jurisdictions, and implementing emergency response plans, where appropriate.
GUARDED	General Risk of Terrorist Attacks	This threat level requires that agencies check communications with designated emergency response and command locations, reviewing and updating emergency response plans, and providing the public with information to better manage a terrorist attack situation.
LOW	Low Risk of Terrorist Attacks	Requires "proactive measures" such as making sure as personnel is trained to deal with a terrorist attack, identifying vulnerabilities to a terrorist attack, and mitigating any vulnerabilities.

5.16.2 Location and Spatial Extent

There are few high risk targets in the Toe River Region. However, Baxter Healthcare, located in Marion, North Carolina, is the sole producer of saline bags for use in administering intravenous fluids, and is therefore a notable facility. Beyond this facility, the region is uniformly at risk to a terrorist attack since such events have no geographic boundaries. However, certain acts of terror,

such as a bombing, will affect localized areas while others, such as chemical agents, may affect areas for miles if carried by persons, water, or wind.

5.16.3 Historical Occurrences

There is no known history of an act of terror occurring in the Toe River Region.

5.16.4 Probability of Future Occurrence

The probability of a future terrorist attack in the Toe River Region is unlikely. However, a single event could have devastating effects on human lives, the economy, and future way of life.

5.17 WILDFIRE

5.17.1 Background

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.²⁴ Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. In South Carolina, 98 percent of wildfires are human-caused. The number one cause is woods arson, followed by debris burning.

There are three classes of wildland fires: surface fire, ground fire and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings. The South Carolina wildfire season runs from late winter to early spring with March being the most severe.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses and industries are located within high wildfire hazard areas. Further, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices, and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can

²⁴ Prescription burning, or “controlled burn,” undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

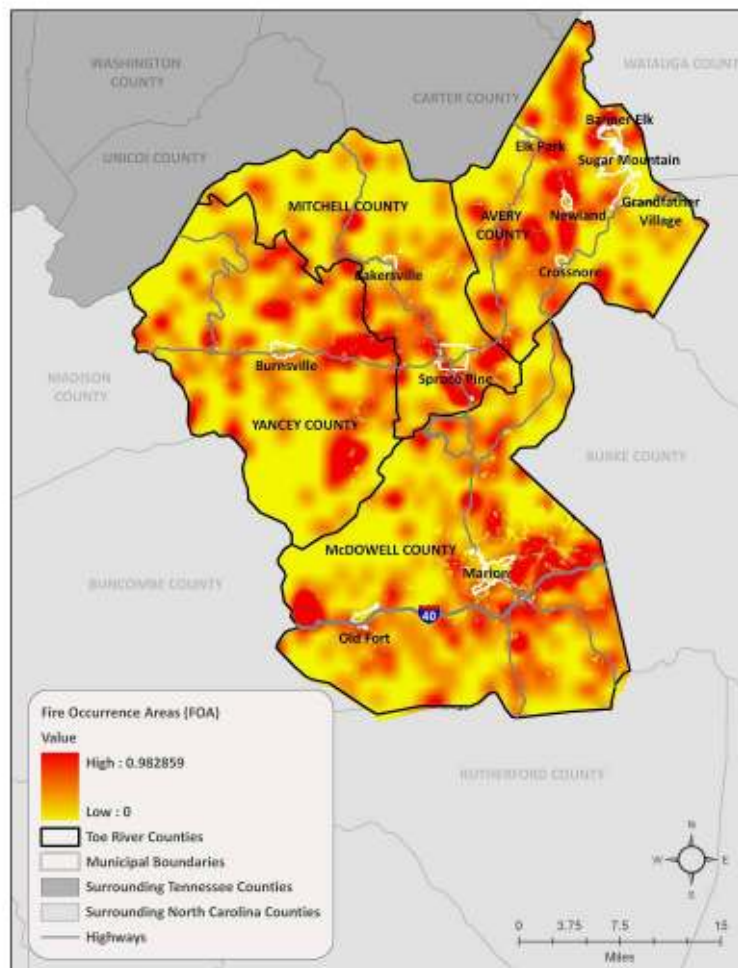
State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning and cooperative land management planning can also be encouraged to reduce fire hazards.

5.17.2 Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, drought conditions may make a fire more likely in those locations. Further, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas.

5.17.3 Historical Occurrences

Figure 4.19 shows the Fire Occurrence Areas (FOA) in the Toe River Region based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE 5.19: HISTORIC WILDFIRE EVENTS IN THE TOE RIVER REGION

Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 1970 to 2008, the Toe River Region experiences an average of 32 wildfires annually which burn a combined 95 acres, on average. **Table 5.35** provides a summary table for wildfire occurrences in the Toe River Region. **Table 5.36** lists the number of reported wildfire occurrences in the participating counties between the years 2000 and 2008.

TABLE 5.35: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (1970 -2008)*

	Avery County	McDowell County	Mitchell County	Yancey County	Toe River Region
Number of Fires per year	19.56	74.72	18.44	16.18	32.22
Number of Acres Burned per fire	1.68	2.36	6.92	2.71	3.42
Number of Acres Burned per year	32.82	176.64	127.53	43.89	95.22

*These values reflect averages over a 38 year period.

Source: North Carolina Division of Forest Resources

TABLE 5.36: HISTORICAL WILDFIRE OCCURRENCES IN THE TOE RIVER REGION

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Avery County									
Number of Fires	30	36	24	10	15	10	36	29	21
Number of Acres	95.0	30.8	13.3	7.4	9.9	31.1	61.6	9.5	26.2
McDowell County									
Number of Fires	36	59	57	16	38	35	78	78	52
Number of Acres	62.1	118.0	69.2	9.7	26.3	23.4	132.3	818.0	295.7
Mitchell County									
Number of Fires	24	35	26	12	24	17	25	35	20
Number of Acres	2794.0	237.8	39.8	22.3	24.5	39.2	106.2	151.1	34.9
Yancey County									
Number of Fires	19	36	25	6	15	20	28	25	27
Number of Acres	76.4	120.5	197.6	14.0	17.0	39.0	58.1	36.7	13.9

Source: North Carolina Division of Forest Resources

In addition, the Toe River Region Hazard Mitigation Planning Committee noted that there was a large wildfire on October 31, 2000 in Tipton Hill (Yancey County). No further information on this event was found through internet searches, but it was characterized as a very large event.

5.17.4 Probability of Future Occurrences

There is a high probability of future wildfire events in the Toe River Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. As noted by the fire chief, the 2010

wildfire season is expected to be especially severe in the region. This is due to the severity of the winter and thus an increased build up in fire fuels on the ground. In addition, increased development in the area leads to increased risk.

5.18 CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its “How-to” guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies and technical reports.

5.18.1 Hazard Extent

Table 5.37 describes the extent of each natural hazard identified for the Toe River Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.37 EXTENT OF TOE RIVER REGION HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (see page 5:5). According the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. The participating jurisdictions have received this ranking twice in the ten year reported history. Extreme Drought conditions were reported in 2000, 2001 and 2002.
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Toe River Region was 2.75 inches. It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.8). The greatest classification of hurricane to impact the Toe River Region was Hurricane Hugo, which was a Category 2 hurricane when it passed through the Region.
Lightning	According to the NOAA flash density map (Figure 5.7), the majority of the Toe River Region is located in an area that experiences 2-8 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Severe Thunderstorm	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 60-year history from the National Climatic Data Center, the strongest recorded thunderstorm wind in the Toe River Region was reported on May 2, 2003 at 70 knots (approximately 80 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by Tornado Occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F2 (last reported on May 7, 1998).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall (36 inches) and single storm snowfall (50 inches) in North Carolina were recorded in the Toe River Region (both in March 1993 at Mount Mitchell).
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.22) and the

	Modified Mercalli Intensity (MMI) scale (Table 5.23) and the distance of the epicenter from the Toe River Region. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the Region was reported in Yancey County with a MMI of VI (strong) with a correlating Richter Scale measurement of approximately 5.4.
Landslide	<p>As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. Further, dollar damage estimates from the North Carolina Department of Transportation only include recent events.</p> <p>Based on the best available data from the North Carolina Geological Survey, extent is defined an average of events per year. It is known that 171 total landslides have occurred in the Toe River Region between 1940 and 2007. This averages to 2.5 landslide events per year</p> <p>Currently, a western North Carolina landslide mapping project is underway. Upon completion, the project may provide more complete data in order to better define the landslide extent. Such information will be incorporated into future updates of this plan.</p>
Hydrologic Hazards	
Dam Failure	Dam Failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.29). Of the 77 dams in the Toe River Region, 40 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in the Toe River Region.
Flood	<p>Flood extent is measured by the amount of land and property in the floodplain. There are approximately 1,219 square miles in the Toe River Region. Of these, there are approximately 0.325 square miles of land in zone A (1-percent annual chance floodplain), 37.815 square miles of land in zone AE (1-percent annual chance with elevation), and 2.506 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The amount of land in the floodplain accounts for 0.03 percent of the total land area in the Toe River Region.</p> <p>The greatest depth of flood waters reported in the region was recorded after the 2004 floods. Waters for that event were estimated to be 21 feet above the normal channel of the river. That event serves as the “flood of record” for the region. “Average” flood events typically include flood waters 4-10 feet above flood stage.</p> <p>The depth of flood waters varies across the region, but generally it is not so much the depth of the floodwaters that causes a problem, but the velocity that causes the most problems. Flash flood waters in mountainous terrain such as that of the Toe River region can be very dangerous and often deadly.</p>
Other Hazards	
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 1970 to 2008. The greatest number of fires to occur in any year was 37 fires. This occurred in 1981 and 1992 in Yancey County when 96 acres and 57 acres were burned, respectively. The greatest number of acres to burn in a single year occurred in 2000 in Mitchell County

when 2,794 acres were burned in 24 fires.

Analyzing the data by county indicates the following wildfire hazard extent for each county.

Avery County

The greatest number of fires to occur in any year was 36 fires. This occurred in 2001 and 2006 when 30.8 acres and 61.6 acres were burned, respectively.

The greatest number of acres to burn in a single year occurred in 1999 when 144.4 acres were burned in 33 fires.

McDowell County

The greatest number of fires to occur in any year was 541 fires. This occurred in 1971 when 277.0 acres and were burned.

The greatest number of acres to burn in a single year occurred in 1985 when 1,021 acres were burned in 98 fires.

Mitchell County

The greatest number of fires to occur in any year was 35 fires. This occurred in 2001 and 2007 when 237.8 acres and 151.1 acres were burned, respectively.

The greatest number of acres to burn in a single year occurred in 2000 when 2,794 acres were burned in 24 fires.

Yancey County

The greatest number of fires to occur in any year was 37 fires. This occurred in 1981 and 1992 when 96 acres and 57 acres were burned, respectively.

The greatest number of acres to burn in a single year occurred in 1970 when 214 acres were burned in 17 fires.

5.18.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the Toe River Region, the results of the hazard profiling process were used to generate countywide hazard classifications according to a “Priority Risk Index” (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for the Toe River Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for the Toe River Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Toe River Region is based principally on the PRI, a tool used to measure the degree of risk for identified hazards in a particular planning area. The PRI is used to assist the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP) in gaining consensus on the determination of those hazards that pose the most significant threat to the Toe River Counties based on a variety of factors. The PRI is not scientifically based, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in the Toe River Region based on standardized criteria.

The application of the PRI results in numerical values that allow identified hazards to be ranked against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed upon weighting factor²⁵, as summarized in **Table 5.38**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

$$\text{PRI VALUE} = [(\text{PROBABILITY} \times .30) + (\text{IMPACT} \times .30) + (\text{SPATIAL EXTENT} \times .20) + (\text{WARNING TIME} \times .10) + (\text{DURATION} \times .10)]$$

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the Toe River Region, the highest PRI value is 3.3 (winter storm and freeze hazard). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the TRRHM Planning Committee.

²⁵ The TRRHM Planning Committee, based upon any unique concerns or factors for the planning area, may adjust the PRI weighting scheme during future plan updates.

TABLE 5.38: PRIORITY RISK INDEX FOR THE TOE RIVER REGION

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self explanatory	1	10%
	12 to 24 hours	Self explanatory	2	
	6 to 12 hours	Self explanatory	3	
	Less than 6 hours	Self explanatory	4	
Duration	Less than 6 hours	Self explanatory	1	10%
	Less than 24 hours	Self explanatory	2	
	Less than one week	Self explanatory	3	
	More than one week	Self explanatory	4	

5.18.3 Priority Risk Index Results

Table 5.39 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the TRRHM Planning Committee. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.39: SUMMARY OF PRI RESULTS FOR THE TOE RIVER REGION

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Small	More than 24 hours	More than one week	2.1
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.6
Hurricane and Tropical Storm	Possible	Minor	Large	More than 24 hours	Less than 24 hours	2.0
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	2.2
Severe Thunderstorm	Highly Likely	Critical	Moderate	Less than 6 hours	Less than 6 hours	3.2
Tornado	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	2.1
Winter Storm and Freeze	Highly Likely	Critical	Large	More than 24 hours	Less than one week	3.3
Geologic Hazards						
Earthquakes	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.3
Landslide	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	2.8
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	More than 24 hours	Less than 6 hours	2.0
Erosion	Possible	Minor	Small	More than 24 hours	More than one week	1.8
Flood	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 24 hours	2.9
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	2.2
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	2.1
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than one week	2.1

5.19 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Toe River Region, including the PRI results and input from the TRRHM Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk and Low Risk (**Table 5.40**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the Toe River Region. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment*. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE 5.40: CONCLUSIONS ON HAZARD RISK FOR THE TOE RIVER REGION

HIGH RISK	Winter Storm and Freeze Severe Thunderstorm/Wind Storm Flood Landslide
MODERATE RISK	Earthquake Hailstorm Lightning Hazardous Material Incident
LOW RISK	Drought Tornado Wildfire Terror Threat Hurricane and Tropical Storm Dam and Levee Failure Erosion

SECTION 6

VULNERABILITY ASSESSMENT

44 CFR Requirement

44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

The remainder of this section is comprised of the following subsections:

6.1:	Overview	6.10	Winter Storm and Freeze
6.2:	Methodology	6.11	Earthquake
6.3:	Study Area Definition	6.12	Landslide
6.4:	Drought	6.13	Dam and Levee Failure
6.5:	Hailstorm	6.14	Flood
6.6	Hurricane and Tropical Storm	6.15	Hazardous Materials Incident
6.7	Lightning	6.16	Terror Threat
6.8	Severe Thunderstorm	6.17	Wildfire
6.9	Tornado		

6.1 OVERVIEW

This section builds upon the information provided in Section 4: *Hazard Identification and Section 5: Hazard Profiles* by identifying and characterizing an inventory of assets in the Toe River Region. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the Toe River counties and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the assets in the Toe River study area including improved property, critical facilities, and population estimates. The remainder of this section focuses on the results of the vulnerability assessment conducted and is organized by hazard as listed below:

- **Atmospheric**

- Drought
- Hailstorm
- Hurricane and Tropical Storm
- Lightning
- Severe Thunderstorm
- Tornado
- Winter Storm and Freeze

- **Geologic**

- Earthquake
- Landslide

- **Hydrologic**

- Dam and Levee Failure
- Flood

- **Other**

- Hazardous Materials Incident
- Terror Threat
- Wildfire

6.2 METHODOLOGY

This vulnerability assessment was conducted using two distinct methodologies: (1) utilizing a geographic information system (GIS)-based analysis; and (2) applying a statistical risk assessment methodology. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information provided in the *Hazard Profile* section. The results of the vulnerability assessment for the aforementioned hazards are provided following the information on hazard identification and analysis.

A GIS-based analysis was conducted for eight hazards:

- Dam and Levee Failure
- Earthquake
- Flood
- Hazardous Materials Incidents
- Hurricane and Tropical Storm
- Landslide
- Wildfire

A statistical risk assessment approach was used to analyze seven hazards:

- Drought
- Hailstorm
- Severe Thunderstorm
- Lightning
- Terror Threat
- Tornado
- Winter Storm and Freeze

A brief description of the two different approaches is provided on the following pages.

6.2.1 GIS-Based Analysis

For the GIS-based analysis, digital data was collected from local, regional, state and national sources. ESRI® ArcGIS™ 9.3 was used to assess hazard vulnerability utilizing this digital data, including local tax assessor records for individual parcels and buildings and geo-referenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.). Using these data layers, hazard vulnerability can be quantified by estimating the assessed building value for parcels and/or buildings determined to be located in identified hazard areas. FEMA's HAZUS-MH software (further described below) was also used to model hurricane winds, riverine flood, and earthquake and estimate potential losses for these hazards. To estimate vulnerable populations in hazard areas, digital Census 2000 data by census block was obtained and census blocks intersecting with hazard areas were used to determine exposed population counts.

The objective of the GIS-based analysis was to determine the estimated vulnerability of people, buildings and critical facilities to the identified hazards for Toe River counties and jurisdictions using best available geospatial data. Local databases were made available through Avery County, McDowell County, and Yancey County including tax assessor records, parcel records, building footprints, and critical facilities data, as well as other regional, state, and federal government data sources were used in combination with digital hazard data as described in the *Hazard Identification and Analysis* section. The results of the analysis provided an estimate of the number of people, buildings, and critical facilities, as well as the value of buildings, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries. A more specific description of the GIS-based analysis conducted for each particular hazard is provided in the individual hazard sections.

HAZUS-MH

HAZUS-MH is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The

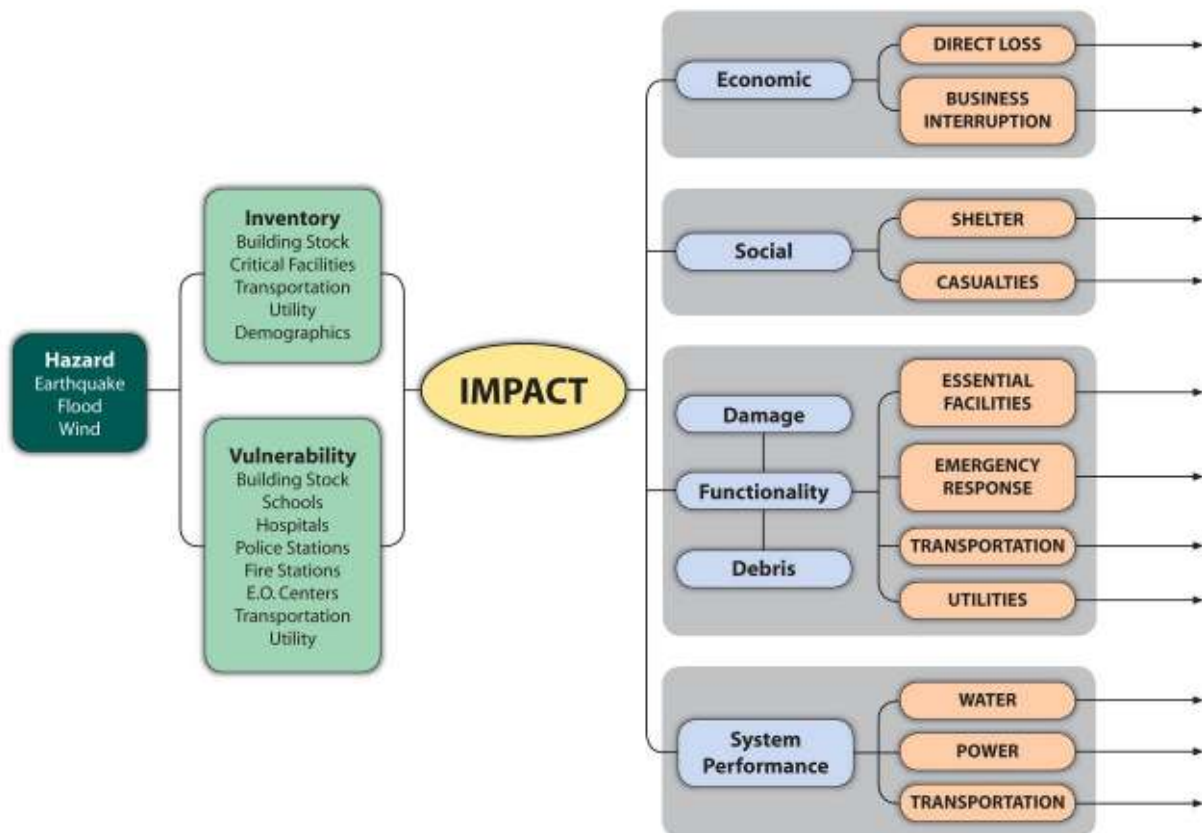


HAZUS-MH risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.

This risk assessment for the Toe River Region applied HAZUS-MH to produce hazard profiles and estimate losses for four hazards for the planning area. At the time this analysis was completed, HAZUS-MH MR-4 was used to estimate potential losses from hurricane winds, flood, and earthquake hazards using HAZUS-MH methodology. In generating loss estimates through HAZUS-MH, some data normalization was necessary to account for recognized differences between actual assessed building values as provided by the Toe River Region counties and estimated replacement building value data as provided within HAZUS-MH. In order to account for the difference between modeled and actual values, the ratio of estimated losses produced by HAZUS-MH as compared to total HAZUS-MH building inventory was used to estimate percent damage. The percent damage ratio was then applied to the local assessed values in order to estimate annualized potential losses and loss ratios in the Toe River Region for this analysis.

Figure 6.1 illustrates the conceptual model of the HAZUS-MH methodology as applied to the Toe River Region.

FIGURE 6.1: CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY



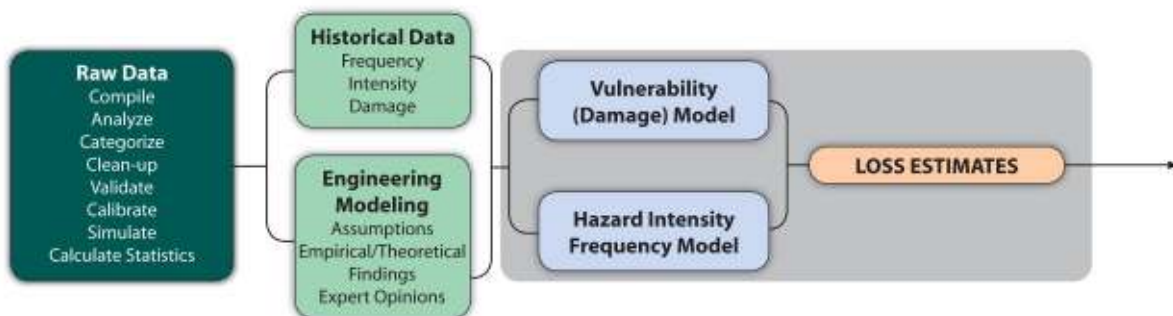
6.2.2 Statistical Risk Assessment Methodology

The statistical risk assessment methodology was applied to analyze hazards of concern that were outside the scope of HAZUS-MH and the GIS-based risk assessment. This includes hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. Examples include hailstorm, lightning, and tornado. This methodology uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information (presented in the *Hazard Identification and Analysis* section). Historical data for each hazard as described in the *Hazard Identification and Analysis* section was used and statistical evaluations were performed using manual calculations. The general steps used in the statistical risk assessment methodology are summarized below:

1. Compile data from local, state and national sources, as well as literature;
2. Clean up data, including removal of duplicate records and update losses to account for inflation;
3. Identify patterns in frequency, intensity, vulnerability and loss
4. Statistically and probabilistically extrapolate the patterns; and
5. Produce meaningful results, including the development of annualized loss estimates.

Figure 6.2 illustrates a conceptual model of the statistical risk assessment methodology as applied to the Toe River Region.

FIGURE 6.2: CONCEPTUAL MODEL OF THE STATISTICAL RISK ASSESSMENT METHODOLOGY



The vulnerability assessment findings are presented in terms of potential annualized losses, whenever possible. In general, presenting results in the annualized form is useful in three ways:

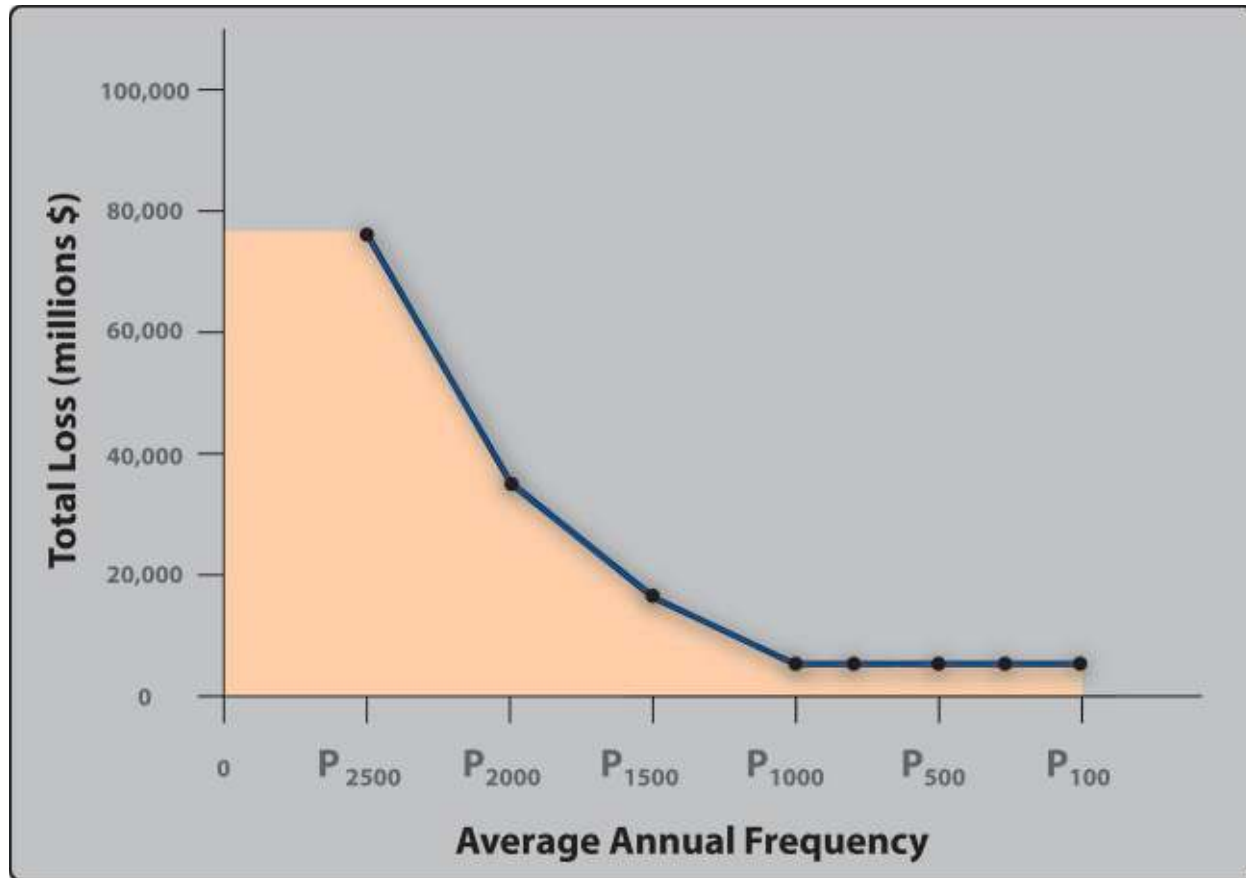
1. This approach accounts for the contribution of potential losses from all future disasters;
2. Annualized results for different hazards are readily comparable, thus easier to rank; and
3. The use of annualized losses is the most objective approach for evaluating mitigation alternatives.

Annualized losses for the hazards where the parametric approach was utilized were computed in a three-step process:

1. Compute/estimate losses for a number of scenario events with different return periods [e.g., 10-year, 100-year, 200-year, 500-year, etc.];
2. Approximate the Probability versus Loss Curve through curve fitting; and
3. Calculate the area under the fitted curve to obtain annualized losses.

This approach is illustrated graphically in **Figure 6.3**. For other hazards where the statistical approach was used, the computations are based primarily on the observed historical losses.

FIGURE 6.3: GRAPHICAL REPRESENTATION OF THE ANNUALIZED LOSS METHODOLOGY



The economic loss results are presented here using two interrelated risk indicators: Annualized Loss and Annualized Loss Ratio. The Annualized Loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction). The Annualized Loss Ratio expresses estimated annualized loss normalized by assessed building value.

The estimated Annualized Loss (AL) addresses the key idea of risk: the probability of the loss occurring in the study area (largely a function of building construction type and quality). By annualizing estimated losses, the AL factors in historic patterns of frequent smaller events with infrequent but larger events to provide a balanced presentation of the risk. The Annualized Loss Ratio (ALR) represents the AL as a fraction of the assessed value of the local inventory. This ratio is calculated using the following formula:

$$\text{ALR} = \text{Annualized Losses} / \text{Total Exposure}$$

The ALR gauges the relationship between average annualized loss and assessed values. This ratio can be used as a measure of vulnerability in the areas and, since it is normalized by assessed value, it can be directly compared across different geographic units such as metropolitan areas, counties or municipalities.

Loss estimates provided in this vulnerability assessment are based on best available data, and the methodologies applied result in an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics or economic parameters).

All conclusions are presented in “Conclusions on Hazard Vulnerability” (Section 6.18) at the end of this section. Findings for each hazard are detailed in the hazard-by-hazard vulnerability assessment that follows.

6.3 STUDY AREA DEFINITION

6.3.1 Asset Inventory

An inventory of geo-referenced assets with the Toe River counties was compiled in order to identify and characterize those properties potentially at risk to the identified hazards¹. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of assets were created and then further assessed through GIS analysis. The two categories of assets consist of:

1. **Improved Property:** Includes all improved properties in the Toe River Region according to local parcel data provided by counties when available.² The information has been expressed in terms of the number of parcels, number of buildings (based upon building footprint data), and total assessed value of improvements (buildings) that may be exposed to the identified hazards. When parcel information was not available, HAZUS-MH was used to determine the number of buildings and their associated value.
2. **Critical Facilities:** Includes airports, fire stations, hospitals, police stations, airports, schools, and other critical facilities located within the Toe River Region. While this listing is not all-inclusive for assets located in the region, it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

The following tables (Table 6.1 and Table 6.2) provide a detailed listing of the geo-referenced assets that have been identified for inclusion in the vulnerability assessment for the Toe River Region.

6.3.2 Improved Property

Table 6.1 lists the number of parcels, the estimated number of buildings and the total assessed value of improvements for participating areas of the Toe River Region (study area of vulnerability assessment).³

TABLE 6.1: IMPROVED PROPERTY IN THE TOE RIVER REGION

Location	Number of Parcels	Estimated Number of Buildings*	Total Assessed Value of Improvements
Avery County	24,293	11,751	\$2,577,894,543
Banner Elk	1,028	545	\$142,749,787
Crossnore	177	117	\$59,721,900
Elk Park	384	231	\$19,177,600
Grandfather Village	443	287	\$210,965,500
Newland	519	354	\$77,856,131

¹ While potentially not all-inclusive for Toe River, “georeferenced” assets include those assets for which specific location data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis. Data for this analysis was obtained from Avery and McDowell Counties.

² Mitchell and Yancey County were unable to provide parcel level data at this time.

³ Total assessed values for improvements is based on 2008 tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities.

Location	Number of Parcels	Estimated Number of Buildings*	Total Assessed Value of Improvements
Sugar Mountain	1,081	520	\$132,855,400
Unincorporated Area	20,661	9,697	\$2,074,516,456
McDowell County	29,015	28,222	\$2,869,597,970
Marion	3,377	3,274	\$429,600,930
Old Fort	472	463	\$63,332,470
Unincorporated Area	25,166	24,485	\$2,376,664,570
Mitchell County[†]	n/a	9,317	\$918,636,000
Bakersville	n/a	287	\$34,482,000
Spruce Pine	n/a	1,321	\$214,504,000
Unincorporated Area	n/a	7,709	\$669,650,000
Yancey County[†]	n/a	10,759	\$1,448,877,000
Burnsville	n/a	1,098	\$141,460,000
Unincorporated Area	n/a	9,661	\$1,307,417,000
TOE RIVER REGION TOTAL	n/a		\$6,118,112,000

*Building improvements under \$5,000 are not included in the building count.

[†] Parcel information is not available for Mitchell County or Yancey at this time. HAZUS MH-4 was used to estimate building count and value.

Source: Avery County GIS, McDowell County GIS, HAZUS MH-4

TABLE 6.2: BUILDING COUNTS FROM HAZUS MR-4

Location	Total Number of Buildings	Residential Buildings	Commercial Buildings	Other Buildings
Avery County	13,150	12,389	437	324
Banner Elk	417	357	42	18
Crossnore	165	149	8	8
Elk Park	351	329	17	5
Grandfather Village	273	270	2	1
Newland	546	470	54	22
Sugar Mountain	749	715	25	9
Unincorporated Area	10,649	10,099	289	261
McDowell County	20,685	19,632	670	383
Marion	3,161	2,833	226	102
Old Fort	633	597	24	12
Unincorporated Area	16,891	16,202	420	269
Mitchell County	9,317	8,797	316	204
Bakersville	287	249	21	17
Spruce Pine	1,321	1,133	113	75
Unincorporated Area	7,709	7,415	182	112
Yancey County	10,759	10,342	262	155
Burnsville	1,098	957	94	47
Unincorporated Area	9,661	9,385	168	108
TOE RIVER REGION TOTAL	53,911	51,160	1,685	1,066

6.3.3 Critical Facilities

Table 6.2 lists the fire stations, police stations, airports, and other essential facilities in the Toe River Region. In addition, **Figure 6.4** shows the locations of essential facilities in the Toe River Region. **Table 6.39**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the counties.

TABLE 6.3: CRITICAL FACILITY INVENTORY IN THE TOE RIVER REGION

Facility	Avery County	McDowell County	Mitchell County	Yancey County	Toe River Region Total
Fire Stations	10	13	10	14	47
Police Stations	8	5	3	3	19
Forest Service	0	1	0	2	3
Hospital	1	0	0	0	0
Schools	10	0	0	0	0
Libraries	1	3	2	2	8
Airports	2	0	0	0	0

Source: Avery County GIS, McDowell County GIS, Yancey County GIS

TABLE 6.4: TOTAL POPULATION IN THE TOE RIVER REGION

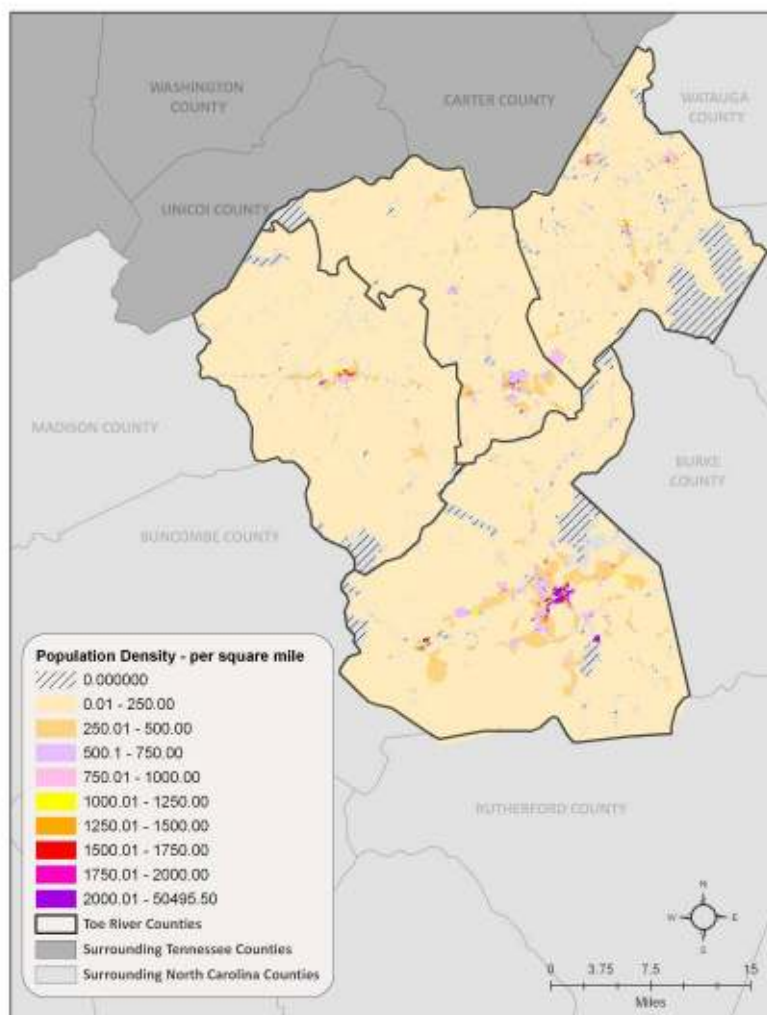
Location	Total Population (2010)
Avery County	17,797
Banner Elk	1,028
Crossnore	192
Elk Park	452
Grandfather Village	25
Newland	698
Sugar Mountain	198
McDowell County	44,996
Marion	7,838
Old Fort	908
Mitchell County	15,579
Bakersville	464
Spruce Pine	2,175
Yancey County	17,818
Burnsville	1,693
TOE RIVER REGION TOTAL	111,861

Source: US Census, 2010

In addition, **Figure 6.5** illustrates the population density per square mile across the region as it was reported by the U.S. Census Bureau in 2000 at the census block level.⁴ The total population in the Toe River Region according to Census data was 111,861 persons. As can be seen in the figure, a majority of the region has less than 250 people per square mile, and McDowell County the highest population concentrations among the participating counties. More specific information on the estimated number of people living within identified hazard areas is provided throughout this section.

⁴ Hazus uses Census 2000 data for mapping populations.

FIGURE 6.5: POPULATION DENSITY IN THE TOE RIVER REGION



Source: U.S. Census Bureau, 2000

Atmospheric Hazards

6.4 DROUGHT

PRI Value: 2.1

Annualized Loss Estimate: *Negligible*

According to the qualitative assessment performed using the PRI tool, the drought hazard scored a PRI value of 2.1 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.4** summarizes the risk levels assigned to each PRI category.

TABLE 6.5: QUALITATIVE ASSESSMENT FOR DROUGHT

Probability	Likely
Impact	Minor
Spatial Extent	Small
Warning Time	More than 24 hours
Duration	More than one week

Because it cannot be predicted where drought may occur, all existing and future buildings, facilities, agricultural crops, and populations in the Toe River Region are considered to be equally exposed to this hazard and could potentially be impacted. However, this hazard has a much greater effect on the natural environment than the built environment.

6.4.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are equally exposed to the drought hazard. Further, all crops and other natural assets are at risk. An exact value for the total crop value (including shrubbery and tree farms) in the area is unknown.⁵ However, drought is typically a regional occurrence, thus posing a threat to all natural assets. Any anticipated future damages or losses are expected to be minimal.

⁵ Attempts were made to contact each county's Cooperative Extension Office. These offices did not have a record of the total value or losses on file.

6.5 HAILSTORM

PRI Value: 2.6

Annualized Loss Estimate: \$46,775

According to the qualitative assessment performed using the PRI tool, the hail hazard scored a PRI value of 2.6 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.5** summarizes the risk levels assigned to each PRI category.

TABLE 6.6: QUALITATIVE ASSESSMENT FOR HAIL

Probability	Highly Likely
Impact	Minor
Spatial Extent	Moderate
Warning Time	Less than 6 hours
Duration	Less than 6 hours

Because it cannot be predicted where hail may fall, all existing and future buildings, facilities and populations in the Toe River counties are considered to be equally exposed to this hazard and could potentially be impacted. The total value for improved value property in the region can be found in Table 6.1. It is important to note that only reported hail events have been factored into this vulnerability assessment.⁶

To estimate losses due to hail, NCDC historical lightning loss data was used to develop a lightning stochastic model. In this model:

- Losses were scaled for inflation;
- Expected annualized losses were calculated through a non-linear regression of historical data.

Table 6.6 summarizes annualized losses due to hail by county, total exposure, and percent loss ratios resulting from the hail hazard for the Toe River Region. While it is assumed that one major hail event could potentially result in significant losses, annualizing structural losses over a long period of time would most yields very low annualized loss estimates for the Toe River Region counties.

TABLE 6.7: ANNUALIZED LOSSES FOR HAIL

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$0	0.00%

⁶ It is possible that additional hail events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis. The North Carolina Department of Insurance was contacted to determine if additional damage reports were available. However, no additional information was obtained.

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
McDowell County	42,151	\$2,869,597,970	\$46,587	0.00%
Mitchell County	15,687	\$918,636,000	\$188	n/a
Yancey County	17,774	\$1,448,877,000	\$0	0.00%
TOE RIVER REGION TOTAL	92,779	\$6,118,112,000	\$46,775	0.00%

6.5.1 Asset Vulnerability

While all of the inventoried assets in the Toe River Region are equally exposed to the hail hazard, any anticipated future damages or losses are expected to be minimal. A list of reported critical facilities for the Toe River Region can be found in **Table 6.39**, near the end of this section.

6.6 HURRICANE AND TROPICAL STORM

PRI Value: 2.0

Annualized Loss Estimate: \$87,500

According to the qualitative assessment performed using the PRI tool, the tropical storm system and hurricane hazard scored a PRI value of 2.0 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.7** summarizes the risk levels assigned to each PRI category.

TABLE 6.8: QUALITATIVE ASSESSMENT FOR TROPICAL STORM SYSTEM AND HURRICANE

Probability	Possible
Impact	Minor
Spatial Extent	Large
Warning Time	More than 24 hours
Duration	Less than 24 hours

Hurricanes and tropical storms often impact large areas and cross jurisdictional boundaries, leaving all existing and future buildings, facilities, and populations exposed to the impact of this hazard. Given its inland location, the Toe River Region would be expected to experience a lesser intensity impact than that of coastal areas. However, all areas are still considered at-risk (see Table 6.1 for the total values of improved property in the counties). Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current HAZUS-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section.

A probabilistic scenario was created using HAZUS-MH to assess the vulnerability of the Toe River Region to hurricane winds. Default HAZUS-MH wind speed data, damage functions, and methodology were

used to determine the potential estimated losses for 50-, 100-, 200-, 500-, and 1000-year frequency events and annual expected loss at the census tract level. **Table 6.8** shows estimated potential losses to improved properties for 50-, 100-, 200-, 500- and 1000-year hurricane wind event scenarios.

TABLE 6.9: ESTIMATED POTENTIAL LOSSES TO IMPROVED PROPERTY FROM TROPICAL STORM SYSTEM AND HURRICANE WIND BY RETURN PERIOD

Location & Level of Event	Estimated Potential Losses
Avery County	
10-year	Less than \$5,000
50-year	Less than \$5,000
100-year	Less than \$5,000
200-year	\$672,000
500-year	\$2,222,000
McDowell County	
10-year	Less than \$5,000
50-year	Less than \$5,000
100-year	\$705,000
200-year	\$780,000
500-year	\$3,076,000
Mitchell County	
10-year	Less than \$5,000
50-year	Less than \$5,000
100-year	Less than \$5,000
200-year	\$702,000
500-year	\$1,951,000
Yancey County	
10-year	Less than \$5,000
50-year	Less than \$5,000
100-year	\$42,000
200-year	\$1,095,000
500-year	\$2,702,000

Source: HAZUS-MH4

Table 6.9 shows total exposure and potential annualized property losses and percent loss ratios resulting from the tropical storm system and hurricane wind hazard for the Toe River Region.

TABLE 6.10: ESTIMATED POTENTIAL ANNUALIZED LOSSES FROM TROPICAL STORM SYSTEM AND HURRICANE WINDS

Location	Estimated Population at Risk	Total Assessed Value of Improvements (buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$16,292	0.00
Banner Elk	811	\$142,749,787	\$716	0.00
Crossnore	242	\$59,721,900	\$190	0.00
Elk Park	459	\$19,177,600	\$208	0.00
Grandfather Village	704	\$210,965,500	\$97	0.00
Newland	226	\$77,856,131	\$486	0.00
Sugar Mountain	73	\$132,855,400	\$2,029	0.00
Unincorporated Area	14,652	\$2,074,516,456	\$12,566	0.00
McDowell County	42,151	\$2,869,597,970	\$42,728	0.00
Marion	4,943	\$429,600,930	\$9,260	0.00
Old Fort	963	\$63,332,470	\$447	0.00
Unincorporated Area	36,245	\$2,376,664,570	\$33,021	0.00
Mitchell County	15,687	\$918,636,000	\$13,491	0.00
Bakersville	357	\$34,482,000	\$317	0.00
Spruce Pine	2,030	\$214,504,000	\$2,461	0.00
Unincorporated Area	13,300	\$669,650,000	\$10,713	0.00
Yancey County	17,774	\$1,448,877,000	\$14,989	
Burnsville	1,623		\$1,298	
Unincorporated Area	16,151		\$13,691	
TOE RIVER REGION TOTAL	\$97,779		\$87,500	

Source: HAZUS MH

6.6.1 Asset Vulnerability

All of the assets inventoried in the Toe River Region are exposed to hurricane and tropical storm wind (Table 6.39). Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

6.7 LIGHTNING

PRI Value: 1.9

Annualized Loss Estimate: \$3,817 (Negligible)

According to the qualitative assessment performed using the PRI tool, the lightning hazard scored a PRI value of 1.9 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.10** summarizes the risk levels assigned to each PRI category.

TABLE 6.11: QUALITATIVE ASSESSMENT FOR LIGHTNING

Probability	Highly Likely
Impact	Minor
Spatial Extent	Negligible
Warning Time	Less than 6 hours
Duration	Less than 6 hours

Because it cannot be predicted where lightning may strike, all existing and future buildings, facilities, and populations in the Toe River Region are considered to be exposed to this hazard and could potentially be impacted. The total improved property values for the Toe River Region are shown in Table 6.1. It is important to note that only reported lightning strikes have been factored into this vulnerability assessment.⁷

To estimate losses due to lightning, NCDC historical lightning loss data was used to develop a lightning stochastic model. In this model:

- Losses were scaled for inflation;
- Expected annualized losses were calculated through a non-linear regression of historical data.

Table 6.11 shows total exposure, potential annualized property losses and percent loss ratios resulting from the lightning hazard for the Toe River Region.

TABLE 6.12: TOTAL EXPOSURE AND POTENTIAL ANNUALIZED LOSSES FROM LIGHTNING

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$417	n/a
McDowell County	42,151	\$2,869,597,970	\$3,381	n/a
Mitchell County	15,687	\$918,636,000	\$19	n/a

⁷ It is possible that additional lightning strikes may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Yancey County	17,774	\$1,448,877,000	\$0	n/a
TOE RIVER REGION TOTAL	92,779	\$12,245,272,684	\$3,817 (Negligible)	n/a

Source: National Climatic Data Center

Given the lack of historical loss data on significant lightning damage occurrences in the Toe River Region, it is assumed that while one major event could potentially result in significant losses due to lightning, annualizing structural losses over a long period of time would most likely yield a very low annualized loss estimate for the region.

6.7.1 Asset Vulnerability

While all of the inventoried assets in the Toe River Region are equally exposed to the lightning hazard, any anticipated future damages or losses are expected to be minimal. Inventoried critical facilities in the Toe River Region can be found in Table 6.39 near in the end of this section.

6.8 SEVERE THUNDERSTORM

PRI Value: 3.2

Annualized Loss Estimate: \$124,206

According to the qualitative assessment performed using the PRI tool, the wind event hazard scored a PRI value of 3.2 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.12** summarizes the risk levels assigned to each PRI category.

TABLE 6.13: QUALITATIVE ASSESSMENT FOR SEVERE THUNDERSTORM

Probability	Highly Likely
Impact	Critical
Spatial Extent	Moderate
Warning Time	Less than 6 hours
Duration	Less than 6 hours

Historical evidence shows that the region is vulnerable to thunderstorm hazards. This is an atmospheric hazard, so all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted. These value of the total buildings in the region are shown in Table 6.1. It is important to note that only reported thunderstorms have been factored into this vulnerability assessment.⁸

⁸ It is possible that additional thunderstorm events have occurred since 1950 that were not reported to NCDC and, thus, are not accounted for in this analysis. The State Fire Marshall's office was contacted to determine if additional data existed, but no additional data was found.

To estimate losses due to severe thunderstorm, NCDC data for occurrences in the Toe River Region was used to develop a severe thunderstorm stochastic model. In this model:

- Losses were scaled for inflation;
- Expected annualized losses were calculated through a non-linear regression of historical data

Table 6.13 shows total exposure and potential annualized property losses and percent loss ratios resulting from the severe thunderstorm hazard for the Toe River Region.

TABLE 6.14: TOTAL EXPOSURE AND POTENTIAL ANNUALIZED LOSSES FROM SEVERE THUNDERSTORM WIND

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$29,888	0.00%
McDowell County	42,151	\$2,869,597,970	\$56,915	0.00%
Mitchell County	15,687	\$918,636,000	\$30,680	0.00%
Yancey County	17,774	\$1,448,877,000	\$31,264	0.00%
TOE RIVER REGION TOTAL	92,779	\$6,118,112,000	\$124,206	0.00%

6.8.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are exposed to the severe thunderstorm wind hazard. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. A complete list of inventoried critical facilities can be found in Table 6.39 near the end of this section.

6.9 TORNADO

PRI Value: 2.1

Annualized Loss Estimate: \$29,928

According to the qualitative assessment performed using the PRI tool, the tornado hazard scored a PRI value of 2.1 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.14** summarizes the risk levels assigned to each PRI category.

TABLE 6.15: QUALITATIVE ASSESSMENT FOR TORNADO

Probability	Possible
Impact	Limited
Spatial Extent	Small
Warning Time	Less than 6 hours
Duration	Less than 6 hours

Historical evidence shows that the city is vulnerable to tornadic activity. This hazard can result from severe thunderstorm activity or may occur during a major tropical storm or hurricane. It cannot be predicted where a tornado may touch down, so all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted. These results are shown in Table 6.1. It is important to note that only reported tornadoes have been factored into this vulnerability assessment⁹.

To estimate losses due to tornadoes, NCDC historical tornado loss data for occurrences in the Toe River Region was used to develop a tornado stochastic model. In this model:

- Losses were scaled for inflation;
- Expected annualized losses were calculated through a non-linear regression of historical data

Table 6.15 shows total exposure and potential annualized property losses and percent loss ratios resulting from the tornado hazard for the Toe River Region.

TABLE 6.16: TOTAL EXPOSURE AND POTENTIAL ANNUALIZED LOSSES FOR TORNADO

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$2,964	0.00%
McDowell County	42,151	\$2,869,597,970	\$11,532	0.00%
Mitchell County	15,687	\$918,636,000	\$0	0.00%

⁹ It is possible that additional tornado events may have occurred since 1950 that were not reported to NCDC and are not accounted for in this analysis.

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Yancey County	17,774	\$1,448,877,000	\$15,433	
TOE RIVER REGION TOTAL	92,779	\$12,245,272,684	\$29,928	0.00%

6.9.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are at risk to the tornado hazard (Table 6.39). Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

6.10 WINTER STORM AND FREEZE

PRI Value: 3.3

Annualized Loss Estimate: \$671,157

According to the qualitative assessment performed using the PRI tool, the winter storm and freeze event hazard scored a PRI value of 3.3 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.16** summarizes the risk levels assigned to each PRI category.

TABLE 6.17: QUALITATIVE ASSESSMENT FOR WINTER STORM AND FREEZE

Probability	Highly Likely
Impact	Critical
Spatial Extent	Large
Warning Time	More than 24 hours
Duration	Less than one week

Historical evidence shows that the Toe River Region is extremely vulnerable to winter storm and freeze hazards. This is an atmospheric hazard, so all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted. These results are shown in Table 6.1. It is important to note that only reported events have been factored into this vulnerability assessment.¹⁰

To estimate losses due to winter storm and freeze events, NCDC data for occurrences in the Toe River Region was used to develop a winter storm and freeze stochastic model. In this model:

- Losses were scaled for inflation;
- Expected annualized losses were calculated through a non-linear regression of historical data

¹⁰ It is possible that additional thunderstorm events have occurred since 1950 that were not reported to NCDC and, thus, are not accounted for in this analysis.

Table 6.17 shows total exposure and potential annualized property losses and percent loss ratios resulting from the winter storm and freeze hazard for the Toe River Region.

TABLE 6.18: TOTAL EXPOSURE AND POTENTIAL ANNUALIZED LOSSES FROM WINTER STORM AND FREEZE EVENTS

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$99,929	0.00%
McDowell County	42,151	\$2,869,597,970	\$358,243	0.01%
Mitchell County	15,687	\$918,636,000	\$101,495	0.01%
Yancey County	17,774	\$1,448,877,000	\$111,490	0.00%
TOE RIVER REGION TOTAL	92,779	\$12,245,272,684	\$671,157	0.01%

6.10.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are exposed to the winter storm and freeze hazard. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. A complete list of inventoried critical facilities can be found in Table 6.39 near the end of this section.

Geologic Hazards

6.11 EARTHQUAKE

PRI Value: 2.3

Annualized Loss Estimate: \$25,469,000

According to the qualitative assessment performed using the PRI tool, the earthquake hazard scored a PRI value of 2.3 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.18** summarizes the risk levels assigned to each PRI category.

TABLE 6.19: QUALITATIVE ASSESSMENT FOR EARTHQUAKE

Probability	Possible
Impact	Minor
Spatial Extent	Moderate
Warning Time	Less than 6 hours
Duration	Less than 6 hours

An earthquake has the potential to impact all existing and future buildings, facilities, and populations. The cumulative figures for population and value of improved structures in the Toe River Region are shown in Table 6.1.

HAZUS-MH ground shaking data, inventory and damage functions, and methodology was used to determine the annual expected loss, as well as exceeding probability curves. **Table 6.19** shows annualized property losses for the Toe River Region. **Table 6.20** shows annualized property losses for the Toe River Region.

Table 6.20: Estimated Potential Losses from Earthquake

Location	Level of Event			
	100-year Event (5.5 magnitude)	500-year Event (5.5 magnitude)	1000-year Event (6.5 magnitude)	2500-year Event (7.5 magnitude)
Avery County	\$145,000	\$4,770,000	\$12,890,000	\$40,016,000
McDowell County	\$303,000	\$9,147,000	\$23,673,000	\$70,818,000
Mitchell County	\$131,000	\$4,005,000	\$10,739,000	\$32,543,000
Yancey County	\$144,000	\$4,211,000	\$11,152,000	\$32,803,000
TOE RIVER REGIONAL TOTAL	\$\$723,000.00	\$22,133,000	\$\$58,454,000.00	\$\$176,180,000.00

Source: HAZUS-MH 4

Table 6.21: Estimated Potential Annualized Losses due to Earthquake

Location	Estimated Annualized Losses				
	Residential	Commercial	Other	Total	Annualized Loss Ratio
Avery County	\$39,000	\$9,000	\$7,000	\$55,000	0.00%
McDowell County	\$66,000	\$23,000	\$16,000	\$105,000	0.00%
Mitchell County	\$28,000	\$10,000	\$8,000	\$46,000	0.01%
Yancey County	\$34,000	\$8,000	\$5,000	\$47,000	0.00%
TOE RIVER REGIONAL TOTAL	\$167,000.00	\$50,000.00	\$36,000.00	\$253,000.00	0.01%

Source: HAZUS-MH 4

6.11.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are exposed to the earthquake hazard (Table 6.39). Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

6.12 LANDSLIDE

PRI Value: 2.8

Annualized Loss Estimate: \$6,710

According to the qualitative assessment performed using the PRI tool, the landslide hazard scored a PRI value of 2.8 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.21** summarizes the risk levels assigned to each PRI category.

TABLE 6.22: QUALITATIVE ASSESSMENT FOR LANDSLIDE

Probability	Highly Likely
Impact	Critical
Spatial Extent	Small
Warning Time	Less than 6 hours
Duration	Less than 6 hours

Although historical evidence proves that the Toe River Region is susceptible to landslide events, there are few reports of damage. Therefore, it is difficult to calculate an accurate annualized loss figure. However, given the recent landslide occurrence damage information provided by the North Carolina Department, an annualized loss estimate of \$6,710 was determined for the Toe River Region. It is

assumed that one major landslide event could potentially result in significant losses, but annualizing structural losses over a long period of time would most likely yield a very low annualized loss estimate for each county. **Table 6.22** summarizes annualized loss estimates for landslide events based on historic damage estimates landslide by county.

TABLE 6.23: ANNUALIZED LOSSES FOR LANDSLIDE EVENTS

Location	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Avery County	17,167	\$2,577,894,543	\$309	0.00%
McDowell County	42,151	\$2,869,597,970	\$1,269	0.00%
Mitchell County	15,687	\$918,636,000	\$343	0.00%
Yancey County	17,774	\$1,448,877,000	\$4,789	0.00%
TOE RIVER REGION TOTAL	92,779	\$6,118,112,000	\$6,710	0.00%

In addition to the annualized loss estimate, the potential total exposure and corresponding value for buildings at risk can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax data, and GIS analysis. **Table 6.23** presents the potential damage estimated where available. The risk levels of low, moderate, and high correspond to the Landslide Susceptibility Index where “Low” indicates a zone of Low Incident/High Susceptibility, “Mod” indicates a zone of Moderate Incident/High Susceptibility, and “High” indicates a zone of High Landslide Susceptibility. Given some level of risk throughout the Toe River Region, it is assumed that the total population is at risk (Table 6.3).

TABLE 6.24: TOTAL EXPOSURE FOR LANDSLIDE HAZARD

Location	Number of Parcels at Risk			Estimated Number of Buildings at Risk*			Total Assessed Value of Improvements at Risk		
	Low	Mod	High	Low	Mod	High	Low	Mod	High
Avery County (total)	18,934	1,380	-	9,039	558	-	\$1,863,406,156	\$187,350,800	-
Banner Elk	-	-	-	-	-	-	-	-	-
Crossnore	-	-	-	-	-	-	-	-	-
Elk Park	-	-	-	-	-	-	-	-	-
Grandfather Village	-	-	-	-	-	-	-	-	-
Newland	-	-	-	-	-	-	-	-	-
Sugar Mountain	-	-	-	-	-	-	-	-	-
Unincorporated Area	18,934	1,380	-	9,039	558	-	\$1,863,406,156	\$187,350,800	-
McDowell County (total)	22,383	6,402	-	21,717	6,283	-	\$2,181,779,025	\$658,640,915	-
Marion	3,377	-	-	3,274	-	-	\$429,321,300	-	-

Location	Number of Parcels at Risk			Estimated Number of Buildings at Risk*			Total Assessed Value of Improvements at Risk		
	Low	Mod	High	Low	Mod	High	Low	Mod	High
Old Fort	-	472	-	-	465	-	-	\$63,332,470	-
Unincorporated Area	19,006	5,930	-	18,443	5,818	-	\$1,752,457,725	\$595,308,445	-
Mitchell County** (total)	n/a	n/a	n/a	6,132	453	695	\$601,552,000	\$267,202,000	\$49,882,000
Bakersville	n/a	n/a	n/a	294	-	-	\$34,482,000	-	-
Spruce Pine	n/a	n/a	n/a	994	271	-	\$142,486,000	\$72,018,000	-
Unincorporated Area	n/a	n/a	n/a	4,844	182	695	\$424,584,000	\$195,184,000	\$49,882,000
Yancey County** (total)	n/a	n/a	n/a	561	2,604	3,660	\$128,256,000	\$486,151,000	\$521,939,000
Burnsville	n/a	n/a	n/a	0	0	972	\$0	\$0	\$141,460,000
Unincorporated Area	n/a	n/a	n/a	561	2,604	2,688	\$128,256,000	\$486,151,000	\$380,479,000
TOE RIVER REGION TOTAL	n/a	n/a	n/a	37,449	9898	4,355	\$4,774,993,181	\$1,581,344,715	\$571,821,000

*Building improvements under \$5,000 are not included in the building count.

**Mitchell County and Yancey County analysis was done using property values from HAZUS-MH which are presented at the census block level. The counties were unable to provide parcel level data at this time.

Source: Avery County GIS, McDowell County GIS, Yancey County GIS, Yancey County Tax Assessor

6.12.1 Asset Vulnerability

Each landslide zone from the Landslide Susceptibility Index was analyzed separately to determine where vulnerability lies. For the low incident/high susceptibility zone, there are 56 critical facilities at risk including 26 fire stations, 13 police stations, 10 schools, 5 libraries, 1 park service facility and 1 airport. The moderate incident/high susceptibility zone has a total of 14 critical facilities including 9 fire stations, 2 libraries, and 1 police station, airport and parks service facility which are at vulnerable to landslide occurrence. Finally, the high incidence zone has a total of 13 facilities at risk including 8 fire stations, 3 police stations, 1 library and 1 parks service facility. A list of specific critical facilities at risk can be found in Table 6.39 near the end of this section.

Hydrologic Hazards

6.13 DAM AND LEVEE FAILURE

PRI Value: 2.0

Annualized Loss Estimate: *Negligible*

According to the qualitative assessment performed using the PRI tool, the dam and levee hazard scored a PRI value of 2.0 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.24** summarizes the risk levels assigned to each PRI category.

TABLE 6.25: QUALITATIVE ASSESSMENT FOR DAM AND LEVEE FAILURE

Probability	Unlikely
Impact	Critical
Spatial Extent	Moderate
Warning Time	More than 24 hours
Duration	Less than 24 hours

In order to determine the buildings and value of property exposed to a dam or levee breach, point data for dam locations and county tax assessor parcel data were used with geographical information systems analysis. The North Carolina Division of Land Management deemed 40 dams in the Toe River Region to be high hazard. However, according to a consensus of local government officials and the Mitigation Advisory Committee, there is an extremely low possibility that any of these state-recognized dams would cause any damage whatsoever should a dam breach or failure occur, despite the hazard classifications assigned to these dams by the state. Therefore, each county then selected which high hazard dams were to be analyzed further, totaling 16 dams. Using GIS, a mile buffer was created around each at risk facility.¹¹ **Table 6.25** and **Figure 6.6** show the results of this analysis.

TABLE 6.26: ESTIMATED EXPOSURE FOR DAM BREACH

	Dam Name	Population	Number of Parcels	Number of Buildings	Total Assessed Value Improved Property
Avery County					
	INVER LOCHY DAM				
	Grandfather Village	0	43	16	\$21,757,800
	Sugar Mountain	0	6	3	\$4,738,200
	Unincorporated area	7	139	61	\$28,310,000
	Total	7	188	80	\$54,806,000
	GRANDMOTHER DAM				

¹¹ It should be noted that this is a course analysis that does not account for actual dam capacity or elevation surrounding the dam.

	Dam Name	Population	Number of Parcels	Number of Buildings	Total Assessed Value Improved Property
	Unincorporated Area (Total)	0	62	34	\$27,118,100
	GRANDFATHER MOUNTAIN DAM				
	Grandfather Village	0	117	86	\$52,751,000
	Unincorporated area	20	101	65	\$57,966,900
	Total	20	218	151	\$110,717,900
	LAND HARBORS DAM*				
	Unincorporated Area (Total)	61	373	258	\$22,048,400
	LINVILLE RIDGE DAM[†]				
	Sugar Mountain	0	2	1	\$2,833,200
	Unincorporated Area	2	292	158	\$124,447,300
	Total	2	294	159	\$127,280,500
	WILDCAT LAKE DAM				
	Banner Elk	228	205	102	\$28,807,500
	Unincorporated area	45	114	49	\$24,353,700
	Total	273	319	151	\$53,161,200
	SUGAR MOUNTAIN DAM[†]				
	Banner Elk	0	52	18	\$11,660,800
	Sugar Mountain	189	657	392	\$86,074,700
	Unincorporated Area	67	451	266	\$106,931,100
	Total	256	1,160	676	\$204,666,600
	Mitchell County				
	SPRUCE PINE WATER SUPPLY #1				
	Unincorporated Area (Total)	0	n/a	258	\$22,087,000
	STRAWBERRY RIDGE (BREACHED)				
	Unincorporated Area (Total)	3	n/a	56	\$4,210,000
	SWISS PINE LAKE DAM				
	Spruce Pine	34	n/a	73	\$19,664,000
	Unincorporated Area	101	n/a	230	\$30,162,000
	Total	135	n/a	303	\$49,826,000
	SPRUCE PINE WATER SUPPLY #2				
	Spruce Pine	18	n/a	58	\$6,506,000
	Unincorporated Area	111	n/a	255	\$30,249,000
	Total	129	n/a	313	\$36,755,000
	EMERALD LAKE DAM (BREACHED)				
	Unincorporated Area (Total)	21	n/a	131	\$12,318,000
	BILL BUCKNER DAM				
	Unincorporated Area	111	n/a	209	\$19,346,000

	Dam Name	Population	Number of Parcels	Number of Buildings	Total Assessed Value Improved Property
	(Total)				
Yancey County					
	Deneen Dam**				

*The Land Harbors Dam is currently being rebuilt. However, once complete, these properties are expected to be vulnerable.

†A full circle buffer was used analyze these dams to ambiguous location and/or cloudy aerial photography.

**the exact location of this dam could not be determined. Once this is determined, the analysis will be completed.

Source: North Carolina Division of Land Management

Given the lack of historical loss data on significant dam or levee failure in the Toe River Region, it is assumed that while one major event could potentially result in significant losses, annualizing structural losses over a long period of time would most likely yield a very low annualized loss estimate for the focus area.

6.13.1 Asset Vulnerability

There are a total of 3 inventoried assets in the Toe River Region determined to be vulnerable to dam failure – Parkway Fire and Rescue #3 (Strawberry Ridge Dam), Sugar Mountain Police Department (Sugar Mountain Dam) and Linville Ridge Fire Station (Sugar Mountain Dam). All of the assets determined to be at risk to dam failure are listed in Table 6.39 toward the end of this section.

It should be noted that the Swifts Lake Dam was of particular concern in the previous Avery County Hazard Mitigation Plan. Located upstream of Cannon Memorial Hospital in Crossnore, failure would result in the only access road to the hospital being washed out. However, since that plan, the hospital has moved and the dam is no dry to leaks and failed repairs. Therefore, this dam poses no threat to Avery County.

6.14 FLOOD

PRI Value: 2.9

Annualized Loss Estimate: \$19,025,000

According to the qualitative assessment performed using the PRI tool, the flood hazard scored a PRI value of 2.9 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.26** summarizes the risk levels assigned to each PRI category.

TABLE 6.27: QUALITATIVE ASSESSMENT FOR FLOOD

Probability	Highly Likely
Impact	Limited
Spatial Extent	Moderate
Warning Time	6 to 12 hours
Duration	Less than 24 hours

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records (2008). The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified Zone A/AE (1-percent-annual-chance floodplain), Zone VE (1-percent-annual-chance coastal flood zone with associated wave action), Zone X500 (0.2-percent-annual-chance floodplain) and the floodway if/where applicable. **Table 6.27** lists the number of properties determined to be located within each of the special flood hazard areas along with the improved values for structures located on those properties. No population figures were included with parcel data, so Hazus-MH was used to estimate those figures.

TABLE 6.28: ESTIMATED TOTAL EXPOSURE OF IMPROVED PROPERTIES TO FLOOD

	At-Risk 1-Percent Annual Chance Flood			At-Risk 0.2 Percent Annual Chance Flood		
Location	Number of Parcels	Number of Buildings	Value of Improved Buildings	Number of Parcels	Number of Buildings	Value of Improved Buildings
Avery County	2,359	1,267	\$324,081,800	685	409	\$111,295,400
Banner Elk	201	111	\$28,545,600	174	100	\$27,567,400
Crossnore	50	39	\$5,450,600	15	8	\$13,111,200
Elk Park	151	100	\$7,014,500	-	-	-
Grandfather Village	27	5	\$3,639,600	-	-	-
Newland	101	70	\$30,248,400	89	63	\$22,178,400
Sugar Mountain	-	-	-	-	-	-
Unincorporated Area	1829	942	\$200,124,700	407	238	\$48,438,400
McDowell County	3,287	3,211	\$649,010,790	699	698	\$238,854,840
Marion	121	121	\$75,124,770	34	34	\$54,469,250

	At-Risk 1-Percent Annual Chance Flood			At-Risk 0.2 Percent Annual Chance Flood		
Location	Number of Parcels	Number of Buildings	Value of Improved Buildings	Number of Parcels	Number of Buildings	Value of Improved Buildings
Old Fort	75	75	\$28,722,230	61	61	\$35,642,420
Unincorporated Area	3091	3015	\$545,163,790	604	603	\$148,743,170
Mitchell County*	n/a	201	16,029,000	n/a	71	\$13,789,000
Bakersville	n/a	62	\$6,662,000	n/a	43	\$5,053,000
Spruce Pine	n/a	16	\$2,648,000	n/a	16	\$6,344,000
Unincorporated Area	n/a	123	\$6,719,000	n/a	12	\$2,392,000
Yancey County*	n/a	5	\$20,964,000	n/a	-	-
Burnsville	n/a	0	\$0	n/a	-	-
Unincorporated Area	n/a	5	\$20,964,000	n/a	-	-
	n/a	4,684	\$1,010,085,590	n/a	1,178	\$363,939,240

*HAZUS census block level property values and number of buildings were used complete the analyses for Mitchell and Yancey Counties.

Riverine Flooding Loss Estimates using HAZUS-MH

HAZUS-MH was used to estimate potential losses in the Toe River Region resulting from potential riverine flood events. A Digital Elevation Model (DEM) was obtained from the USGS for the study area coordinates for input and flood depth was estimated at the pixel level for affected areas, along with the proportion of the area affected within the census block. Transects and stillwater elevations were input from data provided in the 2003 FEMA Flood Insurance Study for this area. HAZUS-MH was utilized to estimate floodplain boundaries, potential exposure for each event frequency, and loss estimates based on probabilistic scenarios for 10-, 50-, 100-, 200- and 500-year flood events using a Level 1 analysis.

6.28 shows estimated potential losses for 10-, 50-, 100-, 200-, and 500-year flood event scenarios that resulted from this analysis.

TABLE 6.29: ESTIMATED POTENTIAL LOSSES TO IMPROVED PROPERTY FROM FLOOD BY RETURN PERIOD

	Estimated Losses by Return Period				
	10-year	50-year	100-year	200-year	500-year
Avery County	\$8,446,000	\$11,987,000	\$14,440,000	\$15,522,000	\$17,281,000
McDowell County	\$14,817,000	\$20,330,000	\$23,333,000	\$26,573,000	\$29,452,000
Mitchell County	\$8,788,000	\$11,833,000	\$13,688,000	\$15,016,000	\$17,415,000

Yancey County	\$7,522,000	\$10,764,000	\$12,062,000	\$13,399,000	\$15,599,000
TOE RIVER REGIONAL TOTAL	\$39,573,000.00	\$54,914,000.00	\$63,523,000.00	\$70,510,000.00	\$79,747,000.00

Source: HAZUS-MH

For the purposes of this risk assessment, the flood hazard was modeled for the 100-year flood hazard, also known as the “1-percent-annual-chance flood.” HAZUS-MH was used to estimate floodplain boundaries and potential losses for the 100-year event frequency. **Table 6.29** shows the estimated number and value of buildings, as well as the number of people that are potentially at risk to flooding by jurisdiction. The losses estimated losses are per event. **Table 6.30** shows potential annualized losses by occupancy type in each jurisdiction. **Table 6.31** shows the total potential annualized losses. The estimated total annualized losses includes losses from each occupancy type (Residential, Commercial, Industrial, Education, Government, Agricultural, and Religious buildings). The total potential losses, according to the HAZUS-MH results are \$10,533,000.

TABLE 6.30: ESTIMATED POTENTIAL EXPOSURE FOR THE 100-YEAR FLOOD

Location	Total Number of People in the Jurisdiction*	Number of People Exposed to Flood Hazard*	Total Value of all Buildings in Jurisdiction**	Number of Exposed Buildings to Flood Hazard**	Total Value of Buildings Exposed**
Avery County	17,167	10	\$1,340,624,000	175	\$26,353,000
Banner Elk	811	0	\$67,313,000	24	\$1,909,000
Crossnore	242	0	\$12,451,000	0	0
Elk park	459	0	\$20,282,000	0	0
Grandfather Village	704	0	\$32,703,000	0	0
Newland	226	0	\$57,764,000	0	0
Sugar mountain	73	0	\$119,820,000	0	0
Unincorporated Area	14,652	10	\$1,030,291,000	151	\$24,444,000
McDowell County	42,151	0	\$2,333,842,000	0	0
Marion	4,943	0	\$417,047,000	0	0
Old Fort	963	0	\$38,540,000	0	0
Unincorporated Area	36,245	0	\$1,878,255,000	0	0
Mitchell County	15,687	5	\$994,769,000	6	\$1,216,000
Bakersville	357	0	\$34,482,000	6	\$1,216,000
Spruce Pine	2,030	0	\$231,156,000	0	0
Unincorporated Area	13,300	5	\$729,131,000	0	0
Yancey County	17,774	0	\$1,448,877,000	0	0
Burnsville	1,623	0	\$141,460,000	0	0
Unincorporated Area	16,151	0	\$1,307,417,000	0	0

Location	Total Number of People in the Jurisdiction*	Number of People Exposed to Flood Hazard*	Total Value of all Buildings in Jurisdiction**	Number of Exposed Buildings to Flood Hazard**	Total Value of Buildings Exposed**
TOE RIVER REGION TOTAL	92,779	15	\$6,118,112,000	181	\$27,569,000

Source: HAZUS-MH MR4; FEMA Q3

* Based on U.S. Census block data (2000). It should be noted that population and structures may be present in these areas based on the parcel level analysis (Table 6.28) from locally provided data. For example, 121 parcels were reported to be at-risk to the 100-year flood in Marion based on parcel data, but zero persons and zero structures were reported to be at risk based on 2000 U.S. Census block level data from HAZUS-MH. Therefore, it should be assumed that some population and structures may be at-risk, and the locally provided data best portrays risk for the communities.

** Based on HAZUS-MH MR4

TABLE 6.31: POTENTIAL ANNUALIZED LOSSES FROM FLOOD BY OCCUPANCY TYPE

Location	Res (\$)	Com (\$)	Ind (\$)	Edu (\$)	Gov (\$)	Agr (\$)	Rel (\$)
Avery County							
Banner Elk	61,000	27,000	5,000	0	0	0	0
Crossnore	0	0	0	0	0	0	0
Elk park	0	0	0	0	0	0	0
Grandfather Village	28,000	1,000	0	0	0	0	0
Newland	156,000	221,000	200,000	0	34,000	13,000	0
Sugar mountain	0	0	0	0	0	0	0
Unincorporated Area	2,555,000	273,000	131,000	20,000	14,000	57,000	101,000
McDowell County							
Marion	568,000	1,000	202,000	0	0	0	6,000
Old Fort	142,000	99,000	7,000	0	0	5,000	0
Unincorporated Area	4,572,000	406,000	734,000	13,000	50,000	23,000	54,000
Mitchell County							
Bakersville	173,000	147,000	16,000	6,000	10,000	0	0
Spruce Pine	419,000	366,000	305,000	10,000	1,000	9,000	96,000
Unincorporated Area	1,727,000	447,000	172,000	53,000	4,000	29,000	2,000
Yancey County							
Burnsville	0	0	0	0	0	0	0
Unincorporated Area	3,129,000	558,000	315,000	133,000	1,000	52,000	66,000
TOE RIVER REGION TOTAL	13,530,000	2,546,000	2,087,000	235,000	114,000	188,000	325,000

Source: HAZUS-MH

TABLE 6.32: POTENTIAL ANNUALIZED LOSSES FROM FLOOD (TOTAL)

Location	Total Value of Occupancy Buildings*	Estimated Total Annualized Losses	Annualized Loss Ratio (%)
Avery County			
Banner Elk	\$67,313,000	\$93,000	0.14
Crossnore	\$12,451,000	0	0.00
Elk park	\$20,282,000	0	0.00
Grandfather Village	\$32,703,000	\$29,000	0.09
Newland	\$57,764,000	\$624,000	0.01
Sugar mountain	\$119,820,000	0	0.00
Unincorporated Area	\$1,030,291,000	\$3,151,000	0.31
McDowell County			
Marion	\$417,047,000	\$777,000	0.19
Old Fort	\$38,540,000	\$253,000	0.66
Unincorporated Area	\$1,878,255,000	\$5,852,000	0.31
Mitchell County			
Bakersville	\$34,482,000	\$352,000	1.02
Spruce Pine	\$231,156,000	\$1,206,000	0.52
Unincorporated Area	\$729,131,000	\$2,434,000	0.33
Yancey County			
Burnsville	\$141,460,000	0	0.00
Unincorporated Area	\$1,307,417,000	\$4,254,000	0.33
TOE RIVER REGION TOTAL	\$6,118,112,000	\$19,025,000	3.91 percent

Source: HAZUS-MH

*This includes the combined annual loss values for all commercial, residential, industrial, education, government, religion, and agricultural buildings.

6.15.1 Asset Vulnerability

There are a total of 12 inventoried assets in the Toe River Region vulnerable to the effects of flood. In the 1-percent annual chance flood zone (100-year floodplain) there are 6 fire stations and 2 police stations. In the 0.2-percent annual chance flood zone (500-year floodplain), there are 2 libraries, 1 fire station, and 1 police station. Specific assets affected by flood are listed in Table 6.39 toward the end of this section.

Other Hazards

6.15 HAZARDOUS MATERIALS INCIDENTS

PRI Value: 2.2

Annualized Loss Estimate: *Negligible*

According to the qualitative assessment performed using the PRI tool, the hazardous materials incident hazard scored a PRI value of 2.2 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.32** summarizes the risk levels assigned to each PRI category.

TABLE 6.33: QUALITATIVE ASSESSMENT FOR HAZARDOUS MATERIALS INCIDENTS

Probability	Possible
Impact	Limited
Spatial Extent	Small
Warning Time	Less than 6 hours
Duration	Less than 24 hours

Hazardous material or toxic releases can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

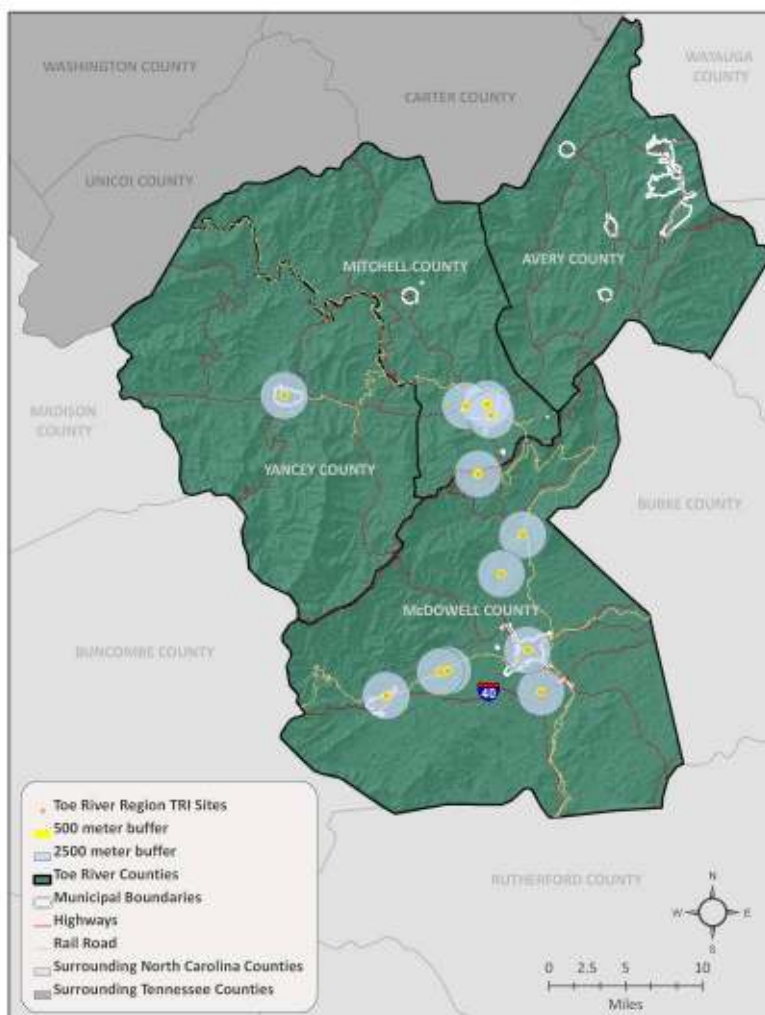
The Toxics Release Inventory (TRI) is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
- Has 10 or more full-time employee equivalents; and
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative and toxic

(PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds or 0.1 grams depending on the chemical.

Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. **Figure 6.7** shows the locations of TRI listed toxic sites (and two Unimin corporation sites) in the Toe River Region along with buffers used for analysis to account for hazardous materials that spread through the air. For fixed site analysis, only TRI sites that have geo-referenced data available were analyzed. Two sizes of buffers—500 and 2,500 meters—are assumed in respect to the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings and engineering judgment. For mobile analysis, the major roads (Interstate highway, U.S. highway and State highway) and railroads are the transportation corridors where hazardous materials are primarily transported that could adversely impact people and buildings. The buffers along the transportation corridors are drawn with the same size as fixed site analysis. **Table 6.33** shows estimated toxic release exposure of people and buildings for fixed sites and **Table 6.34** and **Table 6.35** show the results for mobile site toxic release for 500 meter buffer analysis and 2,500 meter buffer analysis, respectively.

FIGURE 6.6 : TRI SITES WITH BUFFERS IN THE TOE RIVER REGION



Source: EPA

TABLE 6.34: EXPOSURE OF PERSONS AND IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

JURISDICTION	Total Est. Population	Total Property Value*	Immediate Impact (500 meter buffer)		Secondary Impact (2,500 meter buffer)	
			Number of People at Risk	Value of Property at Risk	Number of People at Risk	Value of Property at Risk
Avery County	17,167	\$2,577,894,543	0	\$0	0	\$0
Banner Elk	811	\$142,749,787	0	\$0	0	\$0
Crossnore	242	\$59,721,900	0	\$0	0	\$0
Elk Park	459	\$19,177,600	0	\$0	0	\$0
Grandfather Village	704	\$210,965,500	0	\$0	0	\$0
Newland	226	\$77,856,131	0	\$0	0	\$0
Sugar Mountain	73	\$132,855,400	0	\$0	0	\$0
Unincorporated Area	14,652	\$2,074,516,456	0	\$0	0	\$0
McDowell County	42,151	\$13,722,735,970.00	206	\$68,834,190	8,247	\$677,958,515
Marion	4,943	\$429,600,930	201	\$47,782,240	5,161	\$291,761,200
Old Fort	963	\$63,332,470	2	\$7,763,450	580	\$63,332,470
Unincorporated Area	36,245	\$2,376,664,570	3	\$13,288,500	2,506	\$322,864,845
Mitchell County[†]	15,687	\$918,636,000	152	\$25,002,000	4,113	\$438,714,000
Bakersville	357	\$34,482,000	0	\$0	0	\$0
Spruce Pine	2,030	\$214,504,000	152	\$25,002,000	2,799	\$396,355,000
Unincorporated Area	13,300	\$669,650,000	0	\$0	1,314	\$42,357,000
Yancey County[†]	17,774	\$1,448,877,000	108	\$23,884,000	1,899	\$189,524,000
Burnsville	1,623	\$141,460,000	108	\$23,884,000	1,426	\$141,460,000
Unincorporated Area	16,151	\$1,307,417,000	0	\$0	473	\$48,064,000
Toe River Region TOTAL	92,779	\$6,118,112,000	466	\$117,720,190	14,259	\$1,306,196,515
*Building improvements under \$5,000 are not included in the building count.						
[†] Parcel information is not available for Mitchell County or Yancey County at this time. HAZUS MH-4 was used to estimate building count and value. Values are presented at that census block level.						
Source: Avery County GIS, McDowell County GIS, HAZUS-MH MR-4; U.S. Environmental Protection Agency Toxic Release Inventory (TRI) Sites						

TABLE 6.35: EXPOSURE OF PERSONS AND IMPROVED PROPERTY TO HAZARDOUS MATERIALS - MOBILE SITES (500 METER BUFFER)

JURISDICTION	Total Est. Population	Total Property Value*	Immediate Impact (500 meter buffer)			
			Number of People at Risk		Value of Property at Risk	
			Roads	Railroads	Roads	Railroads
Avery County	17,167	\$2,577,894,543	2,498	0	\$849,221,187	\$0
Banner Elk	811	\$142,749,787	476	0	\$102,006,487	\$0
Crossnore	242	\$59,721,900	118	0	\$24,950,000	\$0
Elk Park	459	\$19,177,600	26	0	\$16,846,900	\$0
Grandfather Village	704	\$210,965,500	14	0	\$65,900,900	\$0
Newland	226	\$77,856,131	361	0	\$74,893,200	\$0
Sugar Mountain	73	\$132,855,400	137	0	\$29,052,600	\$0
Unincorporated Area	14,652	\$2,074,516,456	1,366	0	\$535,571,100	\$0
McDowell County	42,151	\$13,722,735,970.00	5,040	3,810	\$978,111,205	\$473,060,380
Marion	4,943	\$429,600,930	2,588	2,621	\$291,591,210	\$190,816,140
Old Fort	963	\$63,332,470	264	252	\$60,564,820	\$47,706,580
Unincorporated Area	36,245	\$2,376,664,570	2,188	937	\$625,955,175	\$234,537,660
Mitchell County[†]	15,687	\$918,636,000	1,328	507	\$119,075,000	\$97,251,000
Bakersville	357	\$34,482,000	141	0	\$27,177,000	\$0
Spruce Pine	2,030	\$214,504,000	459	428	\$55,218,000	\$89,247,000
Unincorporated Area	13,300	\$669,650,000	728	79	\$36,680,000	\$8,004,000
Yancey County[†]	17,774	\$1,448,877,000	1,096	244	\$275,797,000	\$27,265,000
Burnsville	1,623	\$141,460,000	313	2	\$45,903,000	\$1,016,000
Unincorporated Area	16,151	\$1,307,417,000	783	242	\$229,894,000	\$26,249,000
Toe River Region TOTAL	92,779	\$6,118,112,000	9,962	4,561	\$3,071,425,579	\$597,576,380
*Building improvements under \$5,000 are not included in the building count.						
[†] Parcel information is not available for Mitchell County or Yancey County at this time. HAZUS MH-4 was used to estimate building count and value. Building value is presented it at the census block level.						
Source: Avery County GIS, McDowell County GIS: HAZUS MH-4; U.S. Environmental Protection Agency Toxic Release Inventory (TRI) Sites						

TABLE 6.36: EXPOSURE OF PERSONS AND IMPROVED PROPERTY TO HAZARDOUS MATERIALS - MOBILE SITES (2,500 METER BUFFER)

JURISDICTION	Total Est. Population	Total Property Value*	Secondary Impact (2,500 meter buffer)			
			Number of People at Risk		Value of Property at Risk	
			Roads	Railroads	Roads	Railroads
Avery County	17,167	\$2,577,894,543	8,866	0	\$2,412,769,374	\$0
Banner Elk	811	\$142,749,787	811	0	\$142,749,787	\$0
Crossnore	242	\$59,721,900	242	0	\$59,721,900	\$0
Elk Park	459	\$19,177,600	339	0	\$19,177,600	\$0
Grandfather Village	704	\$210,965,500	33	0	\$210,965,500	\$0
Newland	226	\$77,856,131	226	0	\$77,856,131	\$0
Sugar Mountain	73	\$132,855,400	73	0	\$104,278,200	\$0
Unincorporated Area	14,652	\$2,074,516,456	7,142	0	\$1,798,020,256	\$0
McDowell County	42,151	\$13,722,735,970.00	24,261	18,678	\$2,218,490,855	\$1,555,705,870
Marion	4,943	\$429,600,930	4943	7,115	\$429,600,930	\$344,701,890
Old Fort	963	\$63,332,470	580	580	\$63,332,470	\$63,332,470
Unincorporated Area	36,245	\$2,376,664,570	18,738	10,983	\$1,725,557,455	\$1,147,671,510
Mitchell County[†]	15,687	\$918,636,000	8,810	4,322	\$582,090,000	\$350,982,000
Bakersville	357	\$34,482,000	357	0	\$34,482,000	\$0
Spruce Pine	2,030	\$214,504,000	1,489	1,489	\$214,504,000	\$214,504,000
Unincorporated Area	13,300	\$669,650,000	6,964	2,833	\$298,622,000	\$136,478,000
Yancey County[†]	17,774	\$1,448,877,000	6,559	2,513	\$842,155,000	\$179,865,000
Burnsville	1,623	\$141,460,000	1,611	886	\$141,460,000	\$71,895,000
Unincorporated Area	16,151	\$1,307,417,000	4,948	1,627	\$700,695,000	\$107,970,000
Toe River Region TOTAL	92,779	\$6,118,112,000	48,496	25,513	\$6,055,505,229	\$2,086,552,870
*Building improvements under \$5,000 are not included in the building count.						
[†] Parcel information is not available for Mitchell County or Yancey County at this time. HAZUS MH-4 was used to estimate building count and value. Building value is presented at the census block level.						
Source: Avery County GIS, McDowell County GIS; HAZUS MH-4; U.S. Environmental Protection Agency Toxic Release Inventory (TRI) Sites						

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. Given the lack of historical loss data on significant hazardous materials incidents resulting in structural losses in the Toe River Region, it is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for the Toe River Region.

6.16.1 Asset Vulnerability

There are a total of 20 inventoried assets in the Toe River Region determined to be vulnerable to a hazardous materials incident based on the 2500 meter buffer around each hazardous material site. This 6 libraries, 2 U.S. Forest Service Stations, 6 law enforcement facilities, and 6 fire stations. All of the assets determined to be at risk to hazardous materials are listed in Table 6.39 toward the end of this section.

6.16 TERROR THREAT

PRI Value: 2.1

Annualized Loss Estimate: Negligible

According to the qualitative assessment performed using the PRI tool, the terror hazard scored a PRI value of 2.1 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.36** summarizes the risk levels assigned to each PRI category.

TABLE 6.37: QUALITATIVE ASSESSMENT FOR ACTS OF TERROR

Probability	Unlikely
Impact	Critical
Spatial Extent	Small
Warning Time	Less than 6 hours
Duration	Less than 6 hours

It cannot be predicted where an act of terror may occur, so all existing and future buildings, facilities and populations in the Toe River Region are considered to be equally exposed to this hazard and could potentially be impacted. This cumulative vulnerability is shown in Table 6.1.

Given the lack of historical loss data on terror events in the Toe River Region, it is assumed that while one major event could potentially result in significant losses, annualizing structural losses over a long period of time would most likely yield a very low annualized loss estimate for the region.

6.16.1 Asset Vulnerability

All of the inventoried assets in the Toe River Region are at risk to a terrorist attack (Table 6.39).

6.17 WILDFIRE

PRI Value: 2.1

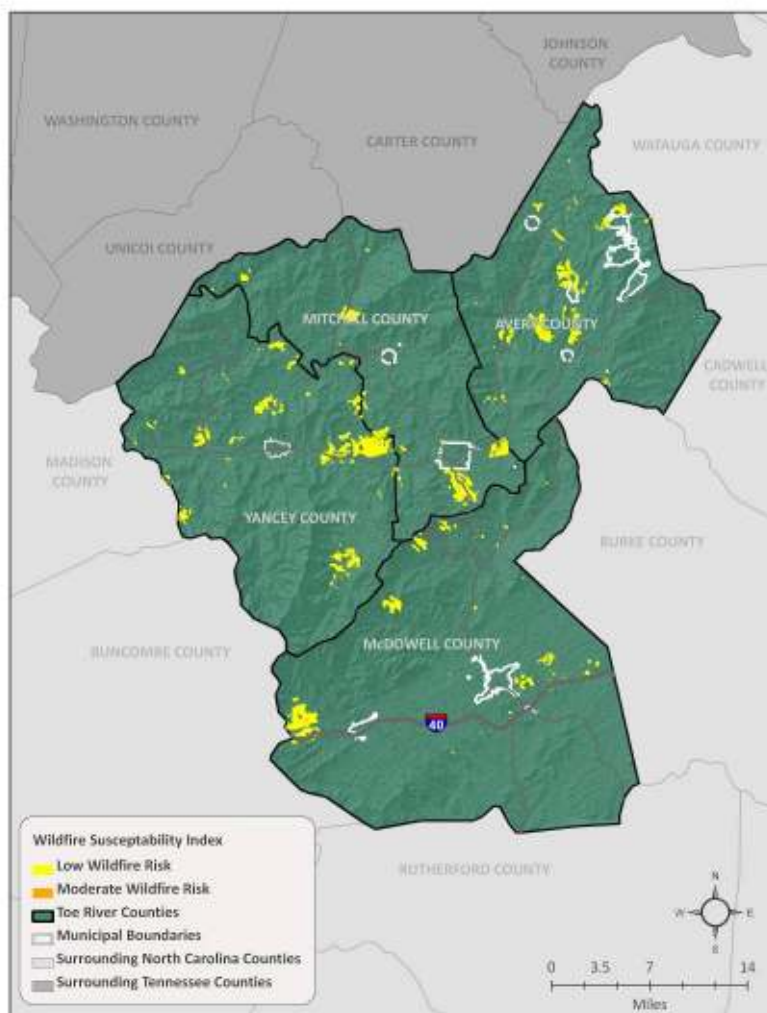
Annualized Loss Estimate: *Negligible*

According to the qualitative assessment performed using the PRI tool, the wildfire hazard scored a PRI value of 2.8 (from a scale of 0 to 4, with 4 being the highest risk level). **Table 6.37** summarizes the risk levels assigned to each PRI category.

TABLE 6.38: QUALITATIVE ASSESSMENT FOR WILDFIRE

Probability	Highly Likely
Impact	Minor
Spatial Extent	Moderate
Warning Time	Less than 6 hours
Duration	Less than one week

The data used to determine vulnerability of people and property to wildfire in the Toe River Region is based on a GIS layer called the “Wild Fire Susceptibility Index” (WFSI). This data was derived from Southern Wildfire Risk Assessment (SWRA) and provided by the North Carolina Division of Forest Resources. The Wild Fire Susceptibility Index combines the probability of an acre igniting with the expected fire size, based on rate of spread in four weather percentile categories. The result is a single measure of wildfire risk corresponding to each gridcode on the map. This is presented on a scale of low, moderate, and high. Low risk areas are assigned a gridcode value of 1 to 3, moderate risk areas have a gridcode value of 4 to 6, and high risk areas have a gridcode value of 7 to 10. Due to the assumptions made, it is not a true probability. However, it does provide a comparison of risk throughout the region. **Figure 6.8** presents the results, which indicate that there few areas of low and moderate risk and no areas of high wildfire risk. A majority of the region has no wildfire risk according to the Southern Wildfire Risk Assessment data.

FIGURE 6.7: WILDFIRE RISK AREAS IN THE TOE RIVER REGION

Source: Southern Wildfire Risk Assessment Data

To estimate exposure to wildfire, a determination of value for at-risk properties was calculated through GIS analysis by summing the total assessed building values for those improved properties confirmed to be located within areas of high or moderate wildfire risk areas. Since there are no areas of high risk in the Toe River Region, only moderate areas were assessed. Only McDowell County and Yancey County had areas of moderate risk to wildfire occurrence. There were no properties found in McDowell or Yancey County that were at-risk to wildfire occurrence based on the Southern Wildfire Risk Assessment data.

Given the lack of historical loss data on wildfire events in the Toe River Region, it is assumed that while one major event could potentially result in significant losses, annualizing structural losses over a long period of time would most likely yield a very low annualized loss estimate for the region.

6.17.1 Asset Vulnerability

No assets were found to be at risk to the wildfire hazard.

6.18 CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the natural hazards in the Toe River Region through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.
- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in the Toe River Region. Updating this risk “snapshot” with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.
- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in the Toe River Region. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the Toe River counties.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through locally assessed values for improvements (buildings), and social exposure can be identified by estimating the population exposed to each hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs. **Table 6.38** provides a summary of the estimated population counts and improved property values at-risk (exposed) to each hazard.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example all building types are considered at risk to the winter storm hazard and commercial, residential and government owned facilities are at risk to repetitive flooding, etc). **Table 6.39** provides a summary of results for the vulnerability assessment conducted for each of the Toe River inventoried critical facility assets. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

TABLE 6.39: SUMMARY OF TOTAL EXPOSURE AND POTENTIAL ANNUALIZED LOSSES TO IDENTIFIED HAZARDS IN THE TOE RIVER REGION

Hazard	Estimated Population At Risk	Total Assessed Value of Improvements (Buildings)	Annualized Expected Property Losses	Annualized Percent Loss Ratio
Atmospheric				
Drought	92,779	\$6,118,112,000	<i>Negligible</i>	n/a
Hailstorm	92,779	\$6,118,112,000	\$46,775	0.00%
Hurricane and Tropical Storm	92,779	\$6,118,112,000	\$87,500	0.00%
Lightning	92,779	\$6,118,112,000	\$3,817 (<i>Negligible</i>)	0.00%
Severe Thunderstorm	92,779	\$6,118,112,000	\$124,206	0.00%
Tornado	92,779	\$6,118,112,000	\$29,928	0.00%
Winter Storm and Freeze	92,779	\$6,118,112,000	\$671,157	0.00%
Geologic				
Earthquake	92,779	\$6,118,112,000	\$825,291.00	0.00%
Landslide	92,779	\$6,118,112,000	\$6,710	0.00%
Hydrologic				
Dam and Levee Failure	1,018	\$6,118,112,000	<i>Negligible</i>	n/a
Flood	15	\$6,118,112,000	\$19,025,000	0.00%
Other				
Hazardous Materials Incident (FIXED - 500 meter buffer)	466	\$6,118,112,000	<i>Negligible</i>	n/a
Hazardous Materials Incident (FIXED - 2,500 meter buffer)	14,259	\$6,118,112,000	<i>Negligible</i>	n/a
Hazardous Materials Incident (MOBILE – Roads - 500m buff)	9,962	\$6,118,112,000	<i>Negligible</i>	n/a
Hazardous Materials Incident (MOBILE – Roads - 500m buff)	4,561	\$6,118,112,000	<i>Negligible</i>	n/a
Hazardous Materials Incident (MOBILE – Rail - 2,500m buff)	48,496	\$6,118,112,000	<i>Negligible</i>	n/a
Hazardous Materials Incident (MOBILE – Rail- 2,500m buff)	25,513	\$6,118,112,000	<i>Negligible</i>	n/a
Terror Threat	92,779	\$6,118,112,000	<i>Negligible</i>	n/a
Wildfire	92,779	\$6,118,112,000	<i>Negligible</i>	n/a

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SECTION 7

CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the Toe River Region to implement hazard mitigation activities. It consists of the following five subsections:

- 7.1 What is a Capability Assessment?
- 7.2 Conducting the Capability Assessment
- 7.3 Capability Assessment Findings
- 7.5 Conclusions on Local Capability

7.1 WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects¹. As in any planning process, it is important to try to establish which goals, objectives and/or actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances or programs already in place; and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the Toe River Region serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the Region to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

¹ While the Interim Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the Region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the Toe River counties, a detailed Capability Assessment Survey² was distributed to members of the Toe River Regional Hazard Mitigation Planning Committee at the project kickoff meeting. The survey questionnaire requested information on a variety of “capability indicators” such as existing local plans, policies, programs or ordinances that contribute to and/or hinder the Region’s ability to implement hazard mitigation actions. Other indicators included information related to the Region’s fiscal, administrative and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. Survey respondents were also asked to comment on the current political climate with respect to hazard mitigation, an important consideration for any local planning or decision making process.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs and resources in place or under development, in addition to their overall effect on hazard loss reduction. In completing the survey, local officials were also required to conduct a self-assessment of their jurisdiction’s specific capabilities. The survey instrument thereby not only helps accurately assess the degree of local capability, but also serves as a good source of introspection for counties and local jurisdictions that want to improve their capabilities as identified gaps, weaknesses or conflicts can be recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information provided in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology³ was then applied to quantify each jurisdiction’s overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on the jurisdiction’s self-assessment of their own planning and regulatory capability, administrative and technical capability, fiscal capability and political capability.

Using this scoring methodology, a total score and an overall capability rating of “High,” “Moderate” or “Limited” could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. In combination with the narrative responses provided by local officials, the results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the Toe River Region to implement hazard mitigation activities. All information is based upon the input provided by local government officials through the Capability Assessment Survey and during meetings of the Toe River Regional Hazard Mitigation Planning Committee.

7.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances and programs that demonstrate a local jurisdiction’s commitment to guiding and managing growth, development and

² The Capability Assessment Survey instrument is available in Appendix B.

³ The scoring methodology used to quantify and rank the Region’s capability can be found in Appendix B.

redevelopment in a responsible manner, while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning and transportation planning, in addition to the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development for the Toe River Region, along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances and programs already in place or under development for the Toe River Region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances and programs should be considered available mechanisms for incorporating the requirements of the Toe River Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES AND PROGRAMS

Planning / Regulatory Tool	AVERY COUNTY	Banner Elk	Crossnore	Elk Park	Grandfather Village	Newland	Sugar Mountain	MCDOWELL COUNTY	Marion	Old Fort	MITCHELL COUNTY	Bakersville	Spruce Pine	YANCEY COUNTY	Burnsville
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	*		✓	*	✓		✓				✓		
Floodplain Management Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Open Space Management Plan (or Parks & Rec/Greenway)	✓	✓	✓	✓	✓	✓	✓	✓	✓						
Stormwater Management Plan/Ordinance	✓	✓	*	*	*	✓	✓					✓			
Natural Resource Protection Plan	✓	✓	✓		✓		✓								
Flood Response Plan	✓	✓	✓	✓	✓	✓	✓	✓							
Emergency Operations Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Continuity of Operations Plan	✓	✓	✓	✓	✓	✓	✓	✓						*	
Evacuation Plan	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	
Disaster Recovery Plan	✓	✓	✓	✓	✓	✓	✓	✓						✓	
Capital Improvements Plan	✓	✓	✓	✓	✓	✓	✓	*	✓		✓	✓	✓	✓	✓

Planning / Regulatory Tool	AVERY COUNTY	Banner Elk	Crossnore	Elk Park	Grandfather Village	Newland	Sugar Mountain	McDOWELL COUNTY	Marion	Old Fort	MITCHELL COUNTY	Bakersville	Spruce Pine	YANCEY COUNTY	Burnsville
Economic Development Plan	✓	✓	*	*	*	*	✓	✓			✓	✓	✓	✓	
Historic Preservation Plan		✓	✓	*		*	✓	✓						✓	
Flood Damage Prevention Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Zoning Ordinance	✓	✓	*	*	✓	✓	✓	✓	✓				✓		✓
Subdivision Ordinance	✓	✓	*	*	✓		✓	✓	✓						✓
Unified Development Ordinance		✓	*	*	*			*							
Post-Disaster Redevelopment Ordinance	✓	✓	✓	✓	✓	✓	✓	*							
Building Code	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
Fire Code	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
National Flood Insurance Program (NFIP)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NFIP Community Rating System															

A more detailed discussion on the Region's planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

7.3.2 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. The three other phases include preparedness, response and recovery. In reality each phase is interconnected with hazard mitigation, as **Figure 7.1** suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as elevation of flood prone structures or through the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards because of its location, design or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities (such as installing storm shutters in advance of a hurricane), and certainly during the long-term recovery and redevelopment process following a hazard event.

FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT



Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess The Toe River Region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment and mitigation strategy.

- Each of the four counties participating in this multi-jurisdictional plan has previously adopted hazard mitigation plans. Each participating jurisdiction was included their respective county's plan.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can

also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- Avery County maintains a Disaster Recovery Plan that is a cooperative effort between the Emergency Management and Planning Departments. The County's plan covers the participating jurisdictions within Avery County.
- McDowell County and Yancey County each maintain Disaster Recovery Plans through their respective Emergency Management Departments.
- Mitchell County does not currently maintain a Disaster Recovery Plan. The County should consider developing a plan to guide the recovery and reconstruction process following a disaster.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Avery County, McDowell County, Mitchell County and Yancey County each maintain Emergency Operations Plans through their respective Emergency Management Departments.
- Avery County's Emergency Operations Plan covers the participating jurisdictions of Grandfather Village, Elk Park, and Crossnore. The participating jurisdictions of Newland, Sugar Mountain, and Banner Elk maintain their own Emergency Operations Plans through their respective Town Managers.
- Mitchell County's Emergency Operations Plan covers the participating jurisdictions of Bakersville and Spruce Pine.
- The City of Marion maintains an Emergency Operations Plan through the Administration, Police, Fire, Public Works, and Planning Departments.

Continuity of Operations Plan: A continuity of operations plan establishes a chain of command, line of succession and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- Avery County and McDowell County currently maintain Continuity of Operations Plans through their respective Emergency Management Departments. The Avery County plan includes the participating jurisdiction of Elk Park.
- The participating jurisdictions of Grandfather Village, Crossnore, Newland, Sugar Mountain, and Banner Elk maintain their own Continuity of Operations Plans.
- Mitchell County does not currently have a Continuity of Operations Plan.
- Yancey County Emergency Management is currently developing a Continuity of Operations Plan.

7.3.3 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning

capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the Toe River Region.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically a comprehensive plan contains sections on demographic conditions, land use, transportation elements and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives and actions.

- Avery County has a comprehensive land use plan that was adopted by the Board of County Commissioners and is maintained by the Planning Department. The participating jurisdictions of Grandfather Village, Sugar Mountain, and Banner Elk maintain their own comprehensive land use plans. The Towns of Crossnore and Newland are currently developing comprehensive land use plans. The Town of Elk Park does not have a comprehensive land use plan.
- McDowell County does not have a comprehensive land use plan. The City of Marion within McDowell County maintains a comprehensive plan through its Planning Department.
- Mitchell County does not have a comprehensive land use plan. The participating jurisdiction of Spruce Pine within Mitchell County maintains a Town Master Plan.
- Yancey County does not have a comprehensive land use plan.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Avery County maintains a Capital Improvements Plan through the County Manager. The participating jurisdictions of Grandfather Village, Elk Park, Crossnore, Newland, Sugar Mountain, and Banner Elk maintain their own Capital Improvements Plans.
- McDowell County is currently developing a Capital Improvements Plan through County Administration. The City of Marion maintains a Capital Improvements Plan through its Finance Department.
- Mitchell County maintains a Capital Improvements Plan through County Administration. The participating jurisdictions of Bakersville and Spruce Pine work with the County to maintain this plan.
- Yancey County maintains a Capital Improvements Plan through its Finance Department. The Town of Burnsville maintains its own Capital Improvements Plan.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards, and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards, or are within a historic district that cannot easily be relocated out of harm's way.

- McDowell County and Yancey County have Historic Preservation Plans.

- Mitchell County does not have a Historic Preservation Plan.
- Avery County does not have a Historic Preservation Plan. The Towns of Newland and Elk Park are currently developing Historic Preservation Plans. The Village of Sugar Mountain and the Towns of Banner Elk and Crossnore currently have Historic Preservation Plans.
- Mitigation strategies such as applying for federal grant funds (i.e., PDM, FMA, HMGP) to protect identified at-risk historic structures in the Toe River Region could be considered in any future historic planning efforts.

Zoning Ordinance: Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- Avery County has a zoning ordinance that is administered by the Planning Department. Grandfather Village, Sugar Mountain, and the Towns of Newland and Banner Elk have adopted zoning ordinances. The Towns of Elk Park and Crossnore are currently developing zoning ordinances.
- McDowell County has a zoning ordinance, but it only covers certain areas of the county. The City of Marion has an adopted zoning ordinance.
- Mitchell County does not have a zoning ordinance. The Town of Spruce Pine within Mitchell County has an adopted zoning ordinance.
- Yancey County does not have a zoning ordinance. The Town of Burnsville within Yancey County has an adopted zoning ordinance.

Subdivision Ordinance: A subdivision ordinance is intended to regulate the development of residential, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- Avery County has a subdivision ordinance that is administered by the Planning Department. Grandfather Village, Sugar Mountain, and Banner Elk have adopted subdivision ordinances. The Towns of Elk Park and Crossnore are currently developing subdivision ordinances.
- McDowell County has a Subdivision Ordinance that was adopted by the Board of County Commissioners in August 2007 and applies to all areas of unincorporated McDowell County. One of the stated purposes of the ordinance is to "reduce the danger to health or peril from flood, erosion, or water pollution." Further, the ordinance limits the steepness of streets specifically to reduce the risk of landslides and landslides affects (injury, blocked roads, etc). The City of Marion has adopted a subdivision ordinance.
- Mitchell County does not have a subdivision ordinance.
- Yancey County does not have a subdivision ordinance. The Town of Burnsville within Yancey County has an adopted subdivision ordinance.

Building Codes, Permitting and Inspections: Building Codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- All of the participating counties and jurisdictions have adopted the North Carolina State Building Code. The building code is enforced by each county's Building Inspector. The City Marion has its own Building Inspector and enforces the North Carolina State Building Code within the City Limits.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program, developed by the Insurance Services Office, Inc. (ISO).⁴ In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes, *with special emphasis on mitigation of losses from natural hazards*. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses, and as a result should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education, as well as number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with a BCEGS grade of 1 representing exemplary commitment to building code enforcement, and a grade of 10 indicating less than minimum recognized protection.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event, and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

⁴ Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in the Toe River Region.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
AVERY COUNTY	9/28/90	12/3/09	177	\$31,852,100	89	\$2,033,698
Banner Elk	1/15/88	12/3/09	37	\$10,053,900	6	\$85,396
Crossnore	8/19/86	12/3/09 (M)	6	\$830,300	3	\$34,480
Elk Park	4/15/86	12/3/09 (M)	7	\$537,300	1	\$2,487
Grandfather Village*		--	--	--	--	--
Newland	12/8/84	12/3/09	17	\$3,840,400	8	\$592,999
Sugar Mountain	6/1/09	NSFHA	3	\$1,050,000	0	0
McDOWELL COUNTY	7/15/88	1/6/10	72	\$13,373,500	18	\$501,231
Marion	5/1/87	1/6/10	5	\$1,799,300	1	\$56,414
Old Fort	7/15/88	1/6/10	15	\$3,561,500	2	\$2,941
MITCHELL COUNTY	9/4/86	6/2/09	26	\$4,629,200	8	\$302,957
Bakersville	5/1/87	6/2/09	12	\$2,861,900	10	\$193,480
Spruce Pine	9/2/88	6/2/09	5	\$890,300	5	\$291,600
YANCEY COUNTY	4/17/84	6/2/09	107	\$22,516,300	33	\$571,208
Burnsville	4/17/84	6/2/09	15	\$3,269,500	4	\$70,736

*Grandfather Village is in the process of re-joining the NFIP

(M) – No elevation determined, all Zone A, C, and X

(NSFHA) – No Special Flood Hazard Area, all Zone C

Source: NFIP claims and policy information as of 11/30/09; NFIP Community Status information as of 2/2/10

Community Rating System: An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP, adding extra local measures to provide

protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3**. As class ratings improve (the lower the number, the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

CRS Class	Premium Reduction
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: FEMA

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years, based on community comments intended to make the CRS more user friendly, and extensive technical assistance available for communities who request it.

- None of the counties or local jurisdictions currently participates in the CRS. Participation in the CRS program should be considered as a mitigation action. The program would be most beneficial to Avery and Yancey Counties, which each have more than 100 NFIP policies.

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and municipalities participating in this hazard mitigation plan, with the exception of Grandfather Village, also participate in the NFIP and they all have adopted flood damage prevention ordinances.

Open Space Management Plan: An open space management plan is designed to preserve, protect and restore largely undeveloped lands in their natural state, and to expand or connect areas in the public domain such as parks, greenways and other outdoor recreation areas. In many instances open space

management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- McDowell County's Recreation Department maintains a Parks and Recreation Plan. The City of Marion has an Open Space Management Plan administered by the City's Planning Department.
- Yancey County and Mitchell County do not have Open Space Management Plans, nor do any of the participating jurisdictions within these counties.
- Avery County enforces an Open Space Management Plan as part of their subdivision ordinance and commercial site plan requirements. Each of the participating jurisdictions in Avery County also has some form of Open Space Management Plan.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- Avery County has an adopted Sedimentation and Erosion Control Ordinance that serves as their Stormwater Ordinance. Sugar Mountain and the Towns of Newland and Banner Elk have adopted Stormwater Management Plans. Grandfather Village and the Towns of Elk Park and Crossnore are currently developing Stormwater Management Plans.
- McDowell County does not have a formal Stormwater Management Plan, but the County follows the North Carolina Department of Environment and Natural Resources (NCDENR) rules for stormwater runoff.
- Mitchell County does not have a Stormwater Management Plan. The Town of Bakersville enforces NCDOT stormwater management regulations.
- Yancey County does not have a formal Stormwater Management Plan.

7.3.6 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 7.4 provides a summary of the Capability Assessment Survey results for the Toe River Region with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	AVERY COUNTY	Banner Elk	Crossnore	Elk Park	Grandfather Village	Newland	Sugar Mountain	McDOWELL COUNTY	Marion	Old Fort	MITCHELL COUNTY	Bakersville	Spruce Pine	VANCEY COUNTY	Burnsville
Planners with knowledge of land development / land management practices	✓	✓	✓	✓	✓		✓	✓	✓						
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	✓	✓	✓	✓	✓		✓		✓						
Planners or engineers with an understanding of natural and/or human-caused hazards	✓	✓	✓	✓	✓		✓	✓	✓						
Emergency Manager	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Floodplain Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		
Land Surveyors															
Scientists familiar with the hazards of the community															
Staff with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	
Personnel skilled in GIS and/or HAZUS	✓		✓	✓	✓		✓	✓	✓		✓			✓	
Resource development staff or grant writers	✓	✓		✓		✓	✓	✓							

7.3.7 Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of outside grant funding awards or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses

are linked to an actual project such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state and federal funding sources.

The Capability Assessment Survey was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the Toe River Region with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE 7.5: RELEVANT FISCAL RESOURCES

Planning / Regulatory Tool	AVERY COUNTY	Banner Elk	Crossnore	Elk Park	Grandfather Village	Newland	Sugar Mountain	McDOWELL COUNTY	Marion	Old Fort	MITCHELL COUNTY	Bakersville	Spruce Pine	YANCEY COUNTY	Burnsville
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		
Special Purpose Taxes (or taxing districts)	✓						✓		✓		✓			✓	
Gas / Electric Utility Fees															
Water / Sewer Fees		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Stormwater Utility Fees		✓				✓									
Development Impact Fees		✓											✓		
General Obligation, Revenue, and/or Special Tax Bonds	✓	✓	✓	✓	✓	✓	✓						✓		
Partnering Arrangements or Intergovernmental Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓

7.3.8 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority, or may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore the local political climate must be considered in designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Capability Assessment Survey was used to capture information on political capability of the Toe River Region. Survey respondents were asked to identify some general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards

that go beyond minimum state or federal requirements (e.g. building codes, floodplain management, etc.).

- Some survey responses provided examples of development regulations that go beyond minimum state or federal requirements. The City of Marion indicated that they enforce a two-foot freeboard in the floodplain and have additional regulations for development along steep slopes. Past mitigation activities in the Toe River Region are described in the next section under *Previously Implemented Mitigation Measures*.
- The Town of Bakersville indicated strong support from its Town Board, which has gone through two disaster events.

7.3.9 Local Self Assessment

In addition to the inventory and analysis of specific local capabilities, the Capability Assessment Survey asked counties and local jurisdictions within the Toe River Region to conduct a self assessment of their perceived capability to implement hazard mitigation activities. As part of this process, local officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, county officials classified each of the aforementioned capabilities as either “limited,” “moderate” or “high.”

Table 7.6 summarizes the results of the self assessment process for the Toe River Region.

TABLE 7.6: SELF ASSESSMENT OF CAPABILITY

Jurisdiction	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Political Capability	OVERALL CAPABILITY
AVERY COUNTY	High	High	High	High	High
Banner Elk	High	High	High	High	High
Crossnore	High	High	High	High	High
Elk Park	High	High	High	High	High
Grandfather Village	High	High	High	High	High
Newland	High	High	High	High	High
Sugar Mountain	High	High	High	High	High
McDOWELL COUNTY	Moderate	Moderate	Limited	Moderate	Moderate
Marion	High	High	High	High	High
Old Fort					

MITCHELL COUNTY	Limited	Moderate	Limited	High	Moderate
Bakersville	Limited	Moderate	Limited	High	Moderate
Spruce Pine	Limited	Moderate	Limited	High	Moderate
YANCEY COUNTY	Moderate	Limited	Limited	Moderate	Limited
Burnsville	Limited	Limited	Limited	Limited	Limited

7.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Capability Assessment Survey. This methodology, further described in Appendix B, attempts to assess the overall level of capability of the Toe River Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varied among the participating jurisdictions. For planning and regulatory capability, the jurisdictions were in the moderate or high range. The administrative and technical capabilities varied widely among the jurisdictions, with larger jurisdictions generally having greater staff and technical resources. Most jurisdictions were in the low to moderate range for fiscal capability.

Table 7.7 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information provided by local officials in response to the Capability Assessment Survey. According to the assessment, the average local capability score for all responding jurisdictions is **44.6**, which falls into the moderate capability ranking.

Table 7.7: Capability Assessment Results

Jurisdiction	Overall Capability Score	Overall Capability Rating
AVERY COUNTY	65	High
Banner Elk	64	High
Crossnore	51	High
Elk Park	48	Moderate
Grandfather Village	56	High
Newland	46	Moderate
Sugar Mountain	61	High
McDOWELL COUNTY	51	High
Marion	45	Moderate

Old Fort		
MITCHELL COUNTY	31	Moderate
Bakersville	27	Moderate
Spruce Pine	34	Moderate
YANCEY COUNTY	29	Moderate
Burnsville	17	Limited

As previously discussed, one of the reasons for conducting a Capability Assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified, for each jurisdiction, in the tables found throughout this section. The participating jurisdictions used the Capability Assessment as part of the basis for the Mitigation Actions that are identified in Section 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

7.4.1 Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy

The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the TRRHMP considered not only each jurisdiction's level of hazard risk but also their existing capability to minimize or eliminate that risk.

SECTION 8

MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the Toe River Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Toe River Regional Mitigation Planning Committee (TRRHMP) and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

- 8.1 Introduction
- 8.2 Mitigation Goals
- 8.3 Identification and Analysis of Mitigation Techniques
- 8.4 Selection of Mitigation Techniques for the Toe River Region
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the Toe River Region with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques deemed available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high risk hazards, but also to help the region achieve compatible economic, environmental and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional*, each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific, mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance), and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the Toe River Region (provided separately in Section 8: *Mitigation Action Plan*). Each County and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflect the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for the Toe River counties and jurisdictions to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Regional Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the Toe River Region, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community. Prioritization of the proposed mitigation actions was based on the following five (5) factors:

8.1.1 Mitigation Action Prioritization

In the previous versions of Toe River county plans, not all actions were prioritized. In addition, there needed to be consistency among the counties and jurisdiction regarding how they prioritized their actions. Therefore, for the 2010 Toe River Regional plan, the TRRHMP members were tasked with establishing a priority for each action at the second TRRHMP meeting (February 18, 2010). Prioritization of the proposed mitigation actions was based on the following six (6) factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review¹
- Funding availability
- Continued compliance with the NFIP

¹ Only a general economic cost/benefit review was considered by the FMHMP through the process of selecting and prioritizing mitigation actions. Mitigation actions with “high” priority were determined to be the most cost effective and most compatible with the participating jurisdictions’ unique needs. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

The point of contact for each county helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above.

Using these criteria, actions were classified as high, moderate, or low priority by the participating jurisdiction officials.

8.2 MITIGATION GOALS

44 CFR Requirement

44 CFR Part 201.6(c)(3)(i): The mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, the Toe River counties and the participating municipalities have developed six goal statements for local hazard mitigation planning in the region. In developing these goals, the previous four county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the four existing plans that were combined to form this regional plan. Many of the goals were similar and regional goals were formulated based on commonalities found between the goals in each plan. These proposed regional goals and their corresponding goals or objectives from the previous plans are presented in **Table 8.1**.

The proposed regional goals were presented, reviewed, voted on, and accepted by the Planning Committee at the second TRRHMP meeting. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The Toe River Region Mitigation Goals are presented in **Table 8.2**. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: PROPOSED MITIGATION GOALS

		Former Plan Reference			
		Avery County	McDowell County	Mitchell County	Yancey County
Goal #1	Establish or participate in local, state, and federal mitigation-oriented and disaster-based programs that lessen the damaging effects of natural hazards thereby protecting life and property.	Goal 1	Obj. 1.1	Goal 9	Goal 1
Goal #2	Investigate, seek funding, and implement unspecified special projects and planning efforts that will reduce the damaging effects of natural hazards.	Goal 4	Goal 3	Goal 9	Goal 2, Goal 4

Goal #3	Enhance or create new policies that will help reduce the damaging effects of natural hazards.	Goal 4	Goal 3	Goal 10	Goal 4
Goal #4	Bolster emergency service capabilities by identifying and seeking funding for necessary equipment, as well as fostering regional cooperation for response and recovery.	Goal 2	Goal 2	Goal 8	Goal 3
Goal #5	Identify and mitigate development and infrastructure in known hazard areas, and avoid building new structures in known hazard areas.	Goal 3	Obj. 2.1	Goal 2, Goal 4	
Goal #6	Increase public awareness of hazard mitigation and hazard risk.		Obj. 1.1	Goal 7	

TABLE 8.2: TOE RIVER MITIGATION GOALS

	Goal
Goal #1	Establish or participate in local, state, and federal mitigation-oriented and disaster-based programs that lessen the damaging effects of natural hazards thereby protecting life and property.
Goal #2	Investigate, seek funding, and implement unspecified special projects and planning efforts that will reduce the damaging effects of natural hazards.
Goal #3	Enhance or create new policies that will help reduce the damaging effects of natural hazards.
Goal #4	Bolster emergency service capabilities by identifying and seeking funding for necessary equipment, as well as fostering regional cooperation for response and recovery.
Goal #5	Identify and mitigate development and infrastructure in known hazard areas, and avoid building new structures in known hazard areas.
Goal #6	Increase public awareness of hazard mitigation and hazard risk.

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement

44 CFR Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Mitigation Strategy for the Toe River Region, a wide range of activities were considered in order to help achieve the established mitigation goals, in addition to addressing any specific hazard concerns. These activities were discussed during the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP) meetings. In general, all activities considered by the TRRHMP can be classified under one of the following six (6) broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Riverine / fault zone setbacks

8.3.2 Property Protection

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

8.3.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes and sand dunes. Parks, recreation or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers

- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

8.3.4 Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

8.3.5 Emergency Services

Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

8.3.6 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions

8.4 SELECTION OF MITIGATION TECHNIQUES FOR THE TOE RIVER REGION

In order to determine the most appropriate mitigation techniques for the communities in the Toe River Region, the TRRHMP members thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities.

Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous Toe River Region county plans were evaluated to determine their 2010 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in *Section 9: Mitigation Action Plan* include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2010 planning process.

SECTION 9

MITIGATION ACTION PLAN

44 CFR Requirement

44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

This section of the Plan includes the listing of the mitigation actions proposed by the participating jurisdictions in the Toe River Region.

- 9.1: Overview
- 9.2: Evaluation and Selection of Proposed Mitigation Action
- 9.3: Mitigation Action Plans

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy*, and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance Procedures*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the Toe River Region. Each action is listed in the MAP in conjunction with background information such as priority, hazard(s) addressed and estimated cost. Other information provided in the MAP includes potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the Toe River Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of “high,” “moderate” or “low” as described below and in Section 8 (page 8.2).

Table 9.1 describes the key elements of the Mitigation Action Plan.

Table 9.1: Key Elements of the Mitigation Action Plan

Jurisdiction Name Mitigation Action Number	Title of Action (Description of action to be undertaken.)
Hazard(s) Addressed:	Hazard which the action addresses.
Category:	Category of Mitigation Strategy that is met: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, Public Education and Awareness
Priority (High, Moderate, Low):	In preparing their own individual Mitigation Actions Place, each jurisdiction considered their overall hazard risk and capability to mitigate natural hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted countywide mitigation goals and the unique needs of the unique needs of their community. Prioritizing mitigation actions for each jurisdiction was based on the following five (5) factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review; and (5) funding availability. This process is also described on page 8:2, Section 8: <i>Mitigation Strategy</i> .
Lead Agency/Department Responsible:	Department responsible for undertaking the action.
Estimated Cost:	Anticipated cost of the action.
Potential Funding Sources:	Local, State, or Federal sources of funds are noted here, where applicable.
Implementation Schedule:	Date by which the action the action should be completed. More information is provided when possible.
Implementation Status (2010):	An indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here.

9.3 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in fifteen individual MAPs on the following pages. **Table 9.2** shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

TABLE 9.2: INDIVIDUAL MAP LOCATIONS

Location	Page	Number of Mitigation Actions
Avery County	9:4	8
Banner Elk	9:6	3
Crossnore	9:8	4
Elk Park	9:10	4
Grandfather Village	9:12	5
Newland	9:14	4
Sugar Mountain	9:15	5
McDowell County	9:17	18
Marion	9:23	4
Old Fort	9:24	4
Mitchell County	9:25	68
Bakersville	9:56	3
Spruce Pine	9:57	3
Yancey County	9:58	14
Burnsville	9:63	7

AVERY COUNTY MITIGATION ACTION PLAN

Avery County Mitigation Action 1	Attempt to acquire/create digital data in order to produce a land use map (including areas of present and future development) in digital format and overlay hazard vulnerability
Hazard(s) Addressed:	All Hazards
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	County Manager/County GIS Department/County Planning and Inspections Department
Estimated Cost:	Unknown
Potential Funding Sources:	Local Funds
Implementation Schedule:	By five-year update of Plan
Implementation Status:	In progress now - expect 3 years to complete

Avery County Mitigation Action 2	Avery County Schools – Update the Shelter-In-Place (SIP) Plan
Hazard(s) Addressed:	All hazards
Category:	Prevention, Emergency Services
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	County Schools Facilities Director/Principals/County Schools Bus Transportation/County Schools Food Service
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Complete by the end of 2004-2005 school year
Implementation Status:	COMPLETED

Avery County Mitigation Action 3	Avery County Schools – Inspect school buildings for cracks and structural flaws annually, as well as immediately after seismic events
Hazard(s) Addressed:	Earthquake
Category:	Prevention, Property Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Complete by the beginning of 2004-2005 school year
Implementation Status:	COMPLETED: Bi-annual Inspections in place

Avery County Mitigation Action 4	Avery County Schools – Conduct annual earthquake drills at each school
Hazard(s) Addressed:	Earthquake
Category:	Public Information and Awareness
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin during the 2004-2005 school year
Implementation Status:	Incomplete because state technical assistance is no longer available.

Avery County Mitigation Action 5	Avery County Schools – At Cranberry Middle School and Freedom Trail Elementary School, study and monitor slopes and retaining walls above and below school buildings, as well as the structural integrity of school buildings. This includes performing detailed inspections during and after severe rains.
Hazard(s) Addressed:	Mudslide; Flood-induced erosion
Category:	Natural Resource Protection, Property Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal
Estimated Cost:	Minimal for inspections; Costs could rise if problems are found and construction must take place for stabilization
Potential Funding Sources:	Local Funds; Grant funds through FEMA
Implementation Schedule:	Begin during the 2004-2005 school year
Implementation Status:	The walls were reinforced and no problems have occurred since then. No inspections have been done since the reinforcement.

Avery County Mitigation Action 6	Investigate feasibility of Dam stabilization or removal for dam located on private property in Montezuma Area
Hazard(s) Addressed:	Dam Failure With Local Flooding
Category:	Structural Projects
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Avery County Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Complete by end of 2005
Implementation Status:	This Dam is no longer there. It was leaking and still had a slow trickle after repairs. It no longer holds water and repairs are in litigation. This actions will be deleted in future plans.

Avery County Mitigation Action 7	Evaluate floodplain ordinance and identify potential improvements (also considering impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Flooding
Category:	Prevention, Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Avery County Floodplain Manager
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Ongoing
Implementation Status:	New Action

Avery County Mitigation Action 8	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Avery County Emergency Management
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Banner Elk Mitigation Action Plan

Banner Elk Mitigation Action 1	Evaluate flooding potential along streams in Town Limits (including developed areas as well areas of future development)
Hazard(s) Addressed:	Flooding
Category:	Prevention, Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council, Town Maintenance Department
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin in 2005
Implementation Status:	COMPLETED. New flood maps were developed. As a result, some areas were rezoned.

Banner Elk Mitigation Action 2	Evaluate floodplain ordinance and identify potential improvements (also considering impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Flooding
Category:	Prevention, Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council, Town Planning Board
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin in 2005
Implementation Status:	Ongoing. This was done following Frances and Ivan. Banner Elk uses the County's ordinance.

Banner Elk Mitigation Action 3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Crossnore Mitigation Action Plan

Crossnore Mitigation Action 1	Evaluate having Town water system mapped for applying for lower fire ratings for structural fire protection within Town Limits
Hazard(s) Addressed:	Wildfire, Earthquake, Lightning, any other hazard which could induce structural fire
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council, Town Water Department, Crossnore Volunteer Fire Department
Estimated Cost:	Moderate
Potential Funding Sources:	Local Funds
Implementation Schedule:	2005 to 2006
Implementation Status:	COMPLETED. The town earned a lower rating (went from a 9 to a 7).

Crossnore Mitigation Action 2	Evaluate the feasibility of developing a plan for floodplain protection within Town Limits (also considering impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Flooding
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Moderate
Potential Funding Sources:	Local Funds
Implementation Schedule:	2006 through 2007
Implementation Status:	Ongoing: The town is working with the county to put together a team that can complete this action.

Crossnore Mitigation Action 3	The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Crossnore Mitigation Action 4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Elk Park Mitigation Action Plan

Elk Park Mitigation Action 1	Study the feasibility of creating and implementing a new Floodplain Ordinance within Town Limits (which would also consider impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Flooding
Category:	Prevention, Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin in 2005
Implementation Status:	COMPLETED. Elk Park uses the County's ordinance which has been updated since 2004.

Elk Park Mitigation Action 2	Evaluate having Town water system mapped for applying for lower fire ratings for structural fire protection within Town Limits
Hazard(s) Addressed:	Wildfire, Earthquake, Lightning, any other hazard which could induce structural fire
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council, Town Water Department, Elk Park Volunteer Fire Department
Estimated Cost:	Moderate
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin in 2006
Implementation Status:	COMPLETED. The town earned a lower rating (went from a 9 to a 6).

Elk Park Mitigation Action 3	The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Elk Park Mitigation Action 4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Grandfather Village Mitigation Action Plan

Grandfather Village Mitigation Action 1	Investigate the feasibility of performing a study on dam stabilization
Hazard(s) Addressed:	Dam Failure
Category:	Structural projects
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Governing Board
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	2006
Implementation Status:	COMPLETED. The lake level was dropped a few years ago to address any problems. The dam is now back at full level.

Grandfather Village Mitigation Action 2	Conduct an evacuation drill for all residents within Village and evaluate current evacuation plan
Hazard(s) Addressed:	All Hazards
Category:	Public Information and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Governing Board and Local Security
Estimated Cost:	Low
Potential Funding Sources:	Local Funds
Implementation Schedule:	2006
Implementation Status:	COMPLETED. The town developed a new evacuation plan and conducted a drill.

Grandfather Village Mitigation Action 3	Educate the Public through a newsletter about the new second exit out of the gated community since few people know about it.
Hazard(s) Addressed:	All Hazards
Category:	Public Information and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Controller
Estimated Cost:	Low, approximate \$500
Potential Funding Sources:	Local Funds
Implementation Schedule:	June 2010 - ongoing
Implementation Status:	NEW

Grandfather Village Mitigation Action 4	The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Town Planning Board, Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Grandfather Village Mitigation Action 5	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Governing Board
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Newland Mitigation Action Plan

Newland Mitigation Action 1	Channel Modification (through the US Army Corps of Engineers)
Hazard(s) Addressed:	Flooding
Category:	Structural Projects
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	\$150,000
Potential Funding Sources:	Army Corps of Engineers
Implementation Schedule:	Hope to complete by 2009
Implementation Status:	COMPLETED.

Newland Mitigation Action 2	Review and update current floodplain regulations (also considering impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Flooding
Category:	Prevention, Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Planning Board
Estimated Cost:	Undetermined
Potential Funding Sources:	Local funds
Implementation Schedule:	Complete by end of 2007
Implementation Status:	COMPLETED. The Town uses the County's ordinance which has been updated since 2004.

Newland Mitigation Action 3	The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Town Planning Board, Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Newland Mitigation Action 4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Village of Sugar Mountain Mitigation Action Plan

Sugar Mountain Mitigation Action 1	Evaluate sheltering-in-place capabilities for all persons within Village Limits
Hazard(s) Addressed:	All hazards, particularly Winter Storms
Category:	Public Information and Awareness
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Town Manager, Town Council, Town Police Department
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Complete by 2005
Implementation Status:	COMPLETED. The Town uses the County's ordinance which has been updated since 2004.

Sugar Mountain Mitigation Action 2	Evaluate action plan for snow removal of roadways and parking areas
Hazard(s) Addressed:	Winter Storm
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council, Town Maintenance Department
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Complete by end of 2006
Implementation Status:	COMPLETED. In addition to a snow removal plan, the Town also has new equipment now.

Sugar Mountain Mitigation Action 3	Evaluate wildfire preparedness (including the consideration of impacts to present and future buildings and infrastructure)
Hazard(s) Addressed:	Wildfire
Category:	Natural Resource Protection, Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Council, Town Manager
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Begin in fall 2004 and complete by winter 2005
Implementation Status:	COMPLETED. The Town continues to work with the North Carolina Forest Service.

Sugar Mountain Mitigation Action 4	The Village will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Sugar Mountain Mitigation Action 5	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

McDOWELL COUNTY MITIGATION ACTION PLAN

McDowell County Mitigation Action 1	At next Land Use Plan update, review and include hazard mitigation objectives.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	This action will be deleted
Implementation Status:	McDowell County does not have a Land Use Plan currently in place. Therefore, this action will be deleted in subsequent plans.

McDowell County Mitigation Action 2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	2008
Implementation Status:	COMPLETED. The 2008 update to the NFIP places restrictions on buildings in flood prone areas.

McDowell County Mitigation Action 3	Update the Floodplain Ordinance to raise the minimum flood protection level.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	October 2008
Implementation Status:	COMPLETED. McDowell County follows the revised October 2008 NFIP standards.

McDowell County Mitigation Action 4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Implementation Schedule:	2008
Implementation Status:	COMPLETED. McDowell County adopted subdivision rules (through a Subdivision Ordinance) in 2007. These objectives were taken into consideration during this process.

McDowell County Mitigation Action 5	Review and revise the Planning Ordinance to allow for clustering of residential lots.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	2008
Implementation Status:	COMPLETED. McDowell County Subdivision Ordinance (updated in 2007) allows for clustering of lots if certain criteria are met.

McDowell County Mitigation Action 6	Revise and update the regulatory floodplain maps.
Hazard(s) Addressed:	Flood
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	unknown
Potential Funding Sources:	Federal/State Funds
Implementation Schedule:	2008
Implementation Status:	COMPLETED. McDowell County in adopted a new FIRM in October 2008.

McDowell County Mitigation Action 7	Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. The following is the inspection plan for damaged structures: 1) Overall damage assessment/data collection (visual inspection from roadways); 2) Data compiled and geographical areas assigned to teams; 3) Second detailed assessment by area teams; 4) Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation; 5) all construction that is repaired, replaced, dried, or sealed will be inspected before covered; 6) Structure inspected for certificate of compliance.
Hazard(s) Addressed:	Flood
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Inspections
Estimated Cost:	Varies
Potential Funding Sources:	Local Funds
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: McDowell County Inspections follows these procedures for submerged properties.

McDowell County Mitigation Action 8	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio, and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on a first come, first served basis; 4) work overtime to expedite utility reconnections.
Hazard(s) Addressed:	All
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Inspections
Estimated Cost:	minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	July 2010
Implementation Status:	The county is working to get these procedures in place. Officials anticipate being able to complete this action as part of the revised budget (July 2010).

McDowell County Mitigation Action 9	Create a zoning map (digital) that can be easily reproduced/ updated for staff and public use.
Hazard(s) Addressed:	All
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	minimal (using in-place staff)
Potential Funding Sources:	Local Funds
Implementation Schedule:	2012
Implementation Status:	In the Planning Stages: McDowell County GIS is working to create a zoning map for the unincorporated areas of McDowell County.

McDowell County Mitigation Action 10	Create and maintain a list of repetitive flood loss properties.
Hazard(s) Addressed:	Flood
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Ongoing
Implementation Status:	COMPLETED (ongoing). These buildings are on file at McDowell County Building Inspections office.

SECTION 9: MITIGATION ACTION PLAN

McDowell County Mitigation Action 11	Ensure adequate evacuation warning in case of major hazard event.
Hazard(s) Addressed:	All
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	\$17,500 per year
Potential Funding Sources:	Grant Funding/General Operating Budget
Implementation Schedule:	July 2010
Implementation Status:	Ongoing: McDowell County Emergency Management has obtained a grant to help cover the costs of installing and managing a reverse 911/emergency notification system. Officials anticipate addition help through the July 2010 budget allocations will allow the county to complete this action.

McDowell County Mitigation Action 12	Improve shelter capacities with alternate power/heat sources.
Hazard(s) Addressed:	Winter Storm
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	Unknown at this time
Potential Funding Sources:	Grant Funding
Implementation Schedule:	2011
Implementation Status:	Ongoing: The county hopes to obtain a grant to complete this action by 2011.

McDowell County Mitigation Action 13	Establish program to maintain continuity of government operations.
Hazard(s) Addressed:	All
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	Minimal (use in-place staff)
Potential Funding Sources:	Local Funds
Implementation Schedule:	
Implementation Status:	COMPLETED. Continuity of government operations in outlined in the McDowell County Emergency Operations Plan.

McDowell County Mitigation Action 14	Identify alternate Emergency Operations Center locations.
Hazard(s) Addressed:	All
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	Unknown; dependent on various options
Potential Funding Sources:	Local Funds
Implementation Schedule:	2011
Implementation Status:	Ongoing: The county is in the planning stages. They move to a new building and have a joint operations center with Mitchell County.

McDowell County Mitigation Action 15	Identify alternate detour routes from major arteries in the county.
Hazard(s) Addressed:	All
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: The county has identified and completed detour routes for Interstate 40, but may also consider routes from other major arteries. These detour routes can be found in the county's Detour Plan.

McDowell County Mitigation Action 16	Place flood protection and other hazard education materials in all branches of the McDowell County public library system.
Hazard(s) Addressed:	All
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Planning and Zoning
Estimated Cost:	Costs of reproducing a plan and materials (minimal)
Potential Funding Sources:	Local Funds
Implementation Schedule:	
Implementation Status:	COMPLETED. These materials are located on the county website (mcdowellgov.com)

McDowell County Mitigation Action 17	The McDowell Planning and Zoning Director has received training on erosion and sedimentation control methods and on floodplain surveying certification. On an annual basis, this official or his designee makes numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owner or developer and are usually handled through the Planning and Zoning Department.
Hazard(s) Addressed:	All
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	McDowell County Planning and Zoning/Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	Ongoing
Implementation Status:	COMPLETED (ongoing). This procedure is in place with all land use ordinances in McDowell County. Planning works alongside Building Inspections on this task.

McDowell County Mitigation Action 18	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	McDowell County Emergency Services
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

City of Marion Mitigation Action Plan

City of Marion Mitigation Action 1	The City will continue to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	City Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

City of Marion Mitigation Action 2	Develop a community awareness program to education the citizens of Marion on hazard risks.
Hazard(s) Addressed:	All
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Planning
Estimated Cost:	Minimal
Potential Funding Sources:	State and local sources
Implementation Schedule:	Short term
Implementation Status:	New

City of Marion Mitigation Action 3	Develop a stormwater management to address with stormwater issues throughout the city.
Hazard(s) Addressed:	Flood, Severe Thunderstorm, Winter Storm and Freeze
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Planning and Zoning, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	State and Local Funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	New

City of Marion Mitigation Action 4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and City Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Old Fort Mitigation Action Plan

Town of Old Fort Mitigation Action 1	The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local Funds
Implementation Schedule:	New
Implementation Status:	New

Town of Old Fort Mitigation Action 2	Develop a community awareness program to education the citizens of Old Fort on hazard risks.
Hazard(s) Addressed:	All
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Planning
Estimated Cost:	Minimal
Potential Funding Sources:	State and local sources
Implementation Schedule:	Short term
Implementation Status:	New

Town of Old Fort Mitigation Action 3	Develop a stormwater management to address with stormwater issues throughout the town.
Hazard(s) Addressed:	Flood, Severe Thunderstorm, Winter Storm and Freeze
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Planning and Zoning, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	State and Local Funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	New

Town of Old Fort Mitigation Action 4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Mayor and Town Council
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

MITCHELL COUNTY MITIGATION ACTION PLAN

Mitchell County Mitigation Action 1	Promote Sustainable Development in Mitchell County
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Unknown
Potential Funding Sources:	Federal, state, and local funds
Implementation Schedule:	Continuous
Implementation Status:	Ongoing: Mitchell County promotes sustainable development in the county. The County received a state grant to assist a local company (PRC) review their building to make it more efficient. This company refurbishes goods.

Mitchell County Mitigation Action 2	Delineate preferred growth areas and develop area plans for target locations.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, State, and private funds
Implementation Schedule:	Underway
Implementation Status:	Mitchell County is currently moving towards GIS which can be used to accomplish this action.

Mitchell County Mitigation Action 3	Develop an open space plan; target properties for acquisition/fund acquisition program.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	\$1,000,000+
Potential Funding Sources:	Federal, State, and private funds
Implementation Schedule:	Ongoing
Implementation Status:	Deferred due to lack of funding: The County was in the process of buying several sawmills along the streams in Mitchell County using state and federal grants and local funds. The plan was to buy out the properties, beginning with one mill, and create open space on the land. However, funds at the local level are not sufficient at this time to complete the task. This is still a priority for the county and will be revisited in the future. In addition, an open space recreation plan was developed for the county.

SECTION 9: MITIGATION ACTION PLAN

Mitchell County Mitigation Action 4	Consider amending subdivision ordinance to allow clustering to maximize density while preserving flood hazard areas.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	minimal
Potential Funding Sources:	Federal, State, and private funds
Implementation Schedule:	Long-term
Implementation Status:	Deferred: At this time, Mitchell County does not have a subdivision ordinance in place. However, officials have considered one in the past and it may be revisited in the future. Further, the county floodplain manager

Mitchell County Mitigation Action 5	Adopt policies that discourage growth in flood hazard areas, including policy on not extending public services and utilities into flood hazard zones.
Hazard(s) Addressed:	All
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	minimal
Potential Funding Sources:	Locals funds
Implementation Schedule:	Ongoing at the jurisdictional level
Implementation Status:	This action will be deleted for the county in subsequent plan updates for the county. This action is included in the actions plans for the county jurisdictions since they handle all public services and utilities.

Mitchell County Mitigation Action 6	Work through Mitchell County Water and Sewer Committee to ensure public is fully informed of and the building permit process incorporates restrictions on providing service within the 100-year floodplain.
Hazard(s) Addressed:	All
Category:	Comprehensive Plan
Priority (High, Moderate, Low):	Prevention
Lead Agency/Department Responsible:	Not assigned in previous plan
Estimated Cost:	Not determined in previous plan
Potential Funding Sources:	Federal, State, and private funds
Implementation Schedule:	Not determined in previous plan
Implementation Status:	This action will be deleted is subsequent plan updates. No Water and Sewer Committee exists.

Mitchell County Mitigation Action 7	Extend zoning to the unincorporated areas of the county.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissions
Estimated Cost:	Minimal
Potential Funding Sources:	Local
Implementation Schedule:	Completed
Implementation Status:	Completed: A Floodplain Ordinance and Watershed zoning ordinance are in place. They are the only zoning-related ordinances in the county. No other zoning ordinances are being considered by the Board at this time.

Mitchell County Mitigation Action 8	Revise zoning ordinance to take into account structures damaged by hazards in non-conforming use provisions.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections (floodplain manager)
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Completed
Implementation Status:	Completed: Although there is no zoning ordinance in the county, the county floodplain ordinance covers this action. Further, it is a state requirement to not rebuild once a hazard has been substantially damaged while in a floodplain.

Mitchell County Mitigation Action 9	Write more specific criteria in the subdivision regulations for flood damage minimization.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections (floodplain manager)
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Completed
Implementation Status:	Completed: Although no subdivision ordinance exists, the recently updated floodplain ordinance sought to minimize flood damage by requiring set-backs and adhering to state and federal flood regulations.

Mitchell County Mitigation Action 10	Develop an impervious surface limit requirement.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local, state, and federal sources
Implementation Schedule:	Ongoing
Implementation Status:	Deferred: This issue is not currently being discussed in the county, but may be in the future if stormwater issues arise.

Mitchell County Mitigation Action 11	Develop a requirement to limit or mitigate the impacts of increased storm water.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and local sources
Implementation Schedule:	Ongoing
Implementation Status:	Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan.

Mitchell County Mitigation Action 12	Develop setback requirements in hazard zones.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: Set-backs are required in the county by the recently updated floodplain ordinance.

Mitchell County Mitigation Action 13	Develop a requirement for all lots to have a build able zone in non hazard areas
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Deferred
Implementation Status:	Deferred: This action would fall under a subdivision ordinance. At this time, Mitchell County does not have a subdivision ordinance in place. However, officials have considered one in the past and it may be revisited in the future.

Mitchell County Mitigation Action 14	Develop a requirement to build developments in a hazard-resilient manner.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Local and private sources
Implementation Schedule:	Long -term
Implementation Status:	Ongoing: Mitchell County will continue to require such measures through the floodplain ordinance and encourage responsible development elsewhere. However, there are no requirements beyond those in the floodplain ordinance at this time.

Mitchell County Mitigation Action 15	Develop a provision for protection or creation of natural areas for hazardous areas.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and local funds
Implementation Schedule:	Ongoing
Implementation Status:	The county completed a master recreation plan that identifies potential green space areas in the county. For example, the county intends to eventually the mills around the streams in the county.

SECTION 9: MITIGATION ACTION PLAN

Mitchell County Mitigation Action 16	Develop an open space preservation plan that plans for further recreational areas in different locations
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	\$25,000
Potential Funding Sources:	State Grant
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: The county completed a master recreation plan that identifies potential green space and preserves existing green space areas in the county.

Mitchell County Mitigation Action 17	Integrate open space preservation plan into the comprehensive plan to combine need for recreational area with unused land due to potential hazards (i.e. floodplain).
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissions
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: The county does not have a comprehensive plan in place at this time. The intention of this action, to preserve unused floodplain land as recreation space, is completed through the county's master recreation plan.

Mitchell County Mitigation Action 18	Develop a Storm Water Management Plan
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	NCDENR, Board of Commissioners
Estimated Cost:	\$30,000
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan.

Mitchell County Mitigation Action 19	Require retention facilities on developments to hold storm water from smaller storms so as to allow seepage on site.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	NCDENR, Board of Commissioners, Building Inspections
Estimated Cost:	Private funds
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan.

Mitchell County Mitigation Action 20	Consider storm water detention facilities (perhaps as public improvements for multiple developments) to store storm water during peak runoff to be released at off-peak times.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	NCDENR, Board of Commissioners, Building Inspections
Estimated Cost:	Private funds
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan.

Mitchell County Mitigation Action 21	Make storm water management a public purpose and implement a program to “take back” major drainage areas or streams within the community through acquisition or easements and maintain them as essential public facilities.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	NCDENR, NRCS, Board of Commissioners, Building Inspections
Estimated Cost:	Private funds
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan.

Mitchell County Mitigation Action 22	Improve and maintain streams throughout the community to the fullest extent possible.
Hazard(s) Addressed:	Flood, Winter Storm and Freeze, Severe Thunderstorm
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	NCDENR, Core of Engineers
Estimated Cost:	1998-\$986,000; 2004-\$1,000,000 (future events expected to be similar to these costs)
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	Ongoing: The previous clean-ups were a result of Ivan and Francis and the associated presidential disaster declaration money. Extensive sediment was removed by dredging and some mitigation measures were put in place (flood walls, etc). No flooding has occurred since the 2004 clean-up.

Mitchell County Mitigation Action 23	Public buildings and facilities should be evaluated by a structural engineer to determine possible improvements that would render them more wind resistant. All new public structures should be built to withstand winds up to 150 miles per hour or more.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Unknown
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Long-term
Implementation Status:	This action will likely be deleted or amended in subsequent plan updates as it relates to coastal areas and hurricane hazard. Further, straight line winds are not a frequent occurrence in the county.

Mitchell County Mitigation Action 24	Evaluate the relocation/elevation/flood proofing needs of all critical public structures or facilities within the floodplain and implement necessary improvements.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Completed
Implementation Status:	COMPELTED: All of the critical buildings in the county have been relocated out of the floodplain or elevated and the floodplain ordinance prohibits building future buildings in the floodplain.

Mitchell County Mitigation Action 25	Minimize placing new critical public facilities within the floodplain, unless they promote an overriding public benefit, will not worsen hazard risk, will not directly promote development in floodplains, and are designed to withstand flood damage.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	Unknown
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Completed
Implementation Status:	COMPELTED: All of the critical buildings in the county have been removed from known hazard areas.

Mitchell County Mitigation Action 26	Several flood monitoring facilities can be placed on the streams and be coupled with a disaster warning system to give early warning of flood problems. A flood warning system, including steam monitoring devices to warn emergency personnel, radio/television announcements, door-to-door contact by fire or police, and mobile public-address would provide more early warning of flood problems.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	NC DENR
Estimated Cost:	Unknown
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	In-place, ongoing
Implementation Status:	Ongoing: The state has a program to monitor all streams in the state called I-Flow.

Mitchell County Mitigation Action 27	Remap the entire floodplain to properly align existing small scale FIRM maps that approximate floodplain boundaries with larger scale, detailed maps in order to provide detailed flood hazard information.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections, state
Estimated Cost:	Unknown
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: Following Floyd and under Risk Map, all floodplain maps in the county were converted to Digital FIRM (DFIRM) maps.

Mitchell County Mitigation Action 28		Review/Update Flood Damage Prevention Ordinance to ensure maximum protection from flood hazard events.
Hazard(s) Addressed:	Flood	
Category:	Prevention	
Priority (High, Moderate, Low):	High	
Lead Agency/Department Responsible:	Inspections	
Estimated Cost:	Minimal, done by the county	
Potential Funding Sources:	Federal, State, and Local Funding Sources	
Implementation Schedule:	Ongoing	
Implementation Status:	Completed/ongoing: The floodplain ordinance was reviewed and updated in 2010. Updates include mandating set-backs in floodplains.	
Additional Notes:	<ul style="list-style-type: none"> o Consider adopting temporary moratorium on new construction and new subdivisions within flood hazard areas until Flood Damage Prevention Ordinance has been updated. 	
	<ul style="list-style-type: none"> o Review rebuilding activities in wake of last floods and consider policies/procedures for minimizing repetitive losses. 	
	<ul style="list-style-type: none"> o Continue to require and maintain FEMA elevation certificates for all permits for new buildings or improvements to buildings on lots including any portion of 100-year floodplain. 	
	<ul style="list-style-type: none"> o Advise/assist property owners in retrofitting their homes and businesses. Retrofitting means modifying an existing building or yard to protect the property from flood damage. 	
	<ul style="list-style-type: none"> o Limit development that would increase flood height 	
	<ul style="list-style-type: none"> o Identify specific properties for wetland preservation or other use 	
	<ul style="list-style-type: none"> o Include measures to preserve the floodplain natural function 	
	<ul style="list-style-type: none"> o Address mobile home parks location 	

Mitchell County Mitigation Action 29		Adopt countywide zoning or adopt zoning in floodplain areas to better control future development in these hazard susceptible areas.
Hazard(s) Addressed:	Flood	
Category:	Prevention	
Priority (High, Moderate, Low):	High	
Lead Agency/Department Responsible:	Inspections	
Estimated Cost:	Minimal	
Potential Funding Sources:	Federal, State, and Local Funding Sources	
Implementation Schedule:		
Implementation Status:	COMPLETED: This action is completed through the county floodplain ordinance by not permitting development in such areas. There is no countywide zoning.	

Mitchell County Mitigation Action 30	Set up centralized, coordinated permitting process, including effective filing/permitting system to ensure compliance with floodplain regulations. Count building improvements cumulatively (maintain permit history so when cumulative improvements equal 50% of building value, (substantial improvement) building must be brought up to flood protection standards for new construction). Goal to eventually have all flood hazard endangered buildings brought up to flood protection standards.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections
Estimated Cost:	unknown
Potential Funding Sources:	Local Funding Sources
Implementation Schedule:	ongoing
Implementation Status:	Completed to date: A system is in place (inner-gov) that allows maps and permits of the entire county to be viewed online. A floodplain layer is included to ensure compliance.

Mitchell County Mitigation Action 31	Implement the emergency operations plan
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: The plan will be implemented as needed and through training exercises.

Mitchell County Mitigation Action 32	Review/update the emergency operations plan
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office
Estimated Cost:	Minimal to none
Potential Funding Sources:	Federal, State, and Local Funding Sources
Implementation Schedule:	Ongoing, Annual Review
Implementation Status:	Ongoing: The county's emergency operation plan is reviewed annually to be compliant with state requirements under the Emergency Management Program Grant. The plan was reviewed on September 16, 2009.
Additional Notes:	o Review the Emergency Management Operational Plan on an annual basis to insure that it is kept current. – Completed, 2010
	o Include human caused disasters in the plan - Completed
	o Provide more specific procedures and guidelines for the emergency manager

Mitchell County Mitigation Action 33	Develop an Evacuation Plan
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Board of Commissioners, Emergency Management
Estimated Cost:	Unknown
Potential Funding Sources:	State grants
Implementation Schedule:	Long-term
Implementation Status:	Deferred: At a recent branch level meeting among regional coordinators, it was determined that western north Carolina was not in immediate of an evacuation plan. Most residents shelter in place. Money was available at the time but it was determined to be best spent on a different project.

Mitchell County Mitigation Action 34	Regional and local governments should limit their expenditures for roads and other infrastructure in high-hazard areas.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners with Planning as the supporting agency.
Estimated Cost:	None
Potential Funding Sources:	State and private funds
Implementation Schedule:	Ongoing
Implementation Status:	This action will be deleted as the county is not responsible for any of the roads. All roads on the county are either state or private and are maintained by them.
Additional Notes:	This technique will discourage development in these areas, which can greatly reduce disaster-related damage and recovery costs. Especially on barrier islands, the public provision of road access appears to be the primary catalyst for development. While this effect is likely to be less dramatic in more accessible locations, it is almost certainly true that the provision of services facilitates growth. To be effective, expenditure limitations should be used in tandem with other land-use programs and tax policies to discourage development in hazard-prone areas. Local governments should make sure that policies present a consistent measure of opposition to development in unwanted locations. High-hazard areas must be specifically identified and mapped.

Mitchell County Mitigation Action 35	Government facilities, especially those that house emergency services, should not be located in high-hazard areas.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners, Building Inspections
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Federal, state, local; federal disaster declaration money was used to relocate the building in 1998.
Implementation Schedule:	Long-term commitment
Implementation Status:	Completed to date: There are no government facilities located in flood hazard areas. A sheriff's building was relocated in 1998 after flooding, and that was the last of the buildings (approximate cost \$1,000,000). No future buildings will be located in such areas per the floodplain ordinance and hazard mitigation plan.

Mitchell County Mitigation Action 36	A basic plan to inform employers about the hazards in the region; provide information and funding sources available at different levels for mitigation efforts; and to plan for specific needs of businesses for future development would be of great use.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Chamber of Commerce, Board of Commissioners
Estimated Cost:	Minimal
Potential Funding Sources:	Local funds, state grants
Implementation Schedule:	Long-term
Implementation Status:	Deferred: While there is no plan in plan, officials felt that most industrials have an understanding of the area's risks. This issue may be revisited in the future.
Additional Notes:	There is no existing plan about the business and industries in the region. Several of them are located in harm's way and the local economy needs to do its best to prevent damage to its assets.

Mitchell County Mitigation Action 37	Develop an inclement weather plan that would detail specific actions to be taken when inclement weather occurs, such as ice, snow, and severe storm damage.
Hazard(s) Addressed:	Multiple
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management Office
Estimated Cost:	Minimal
Potential Funding Sources:	State or local money
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: The county addresses inclement weather through the media and websites. However an official plan is not in plan and the need to implement one due to tourists in the area is recognized.
Additional Notes:	Inclement weather is the most common emergency in the county, highlighting the need for a plan. The plan would be coupled with a section in the emergency operational guideline that designates county personnel responsible for different tasks when inclement weather occurs.

Mitchell County Mitigation Action 38	Develop an inclement weather plan that would detail specific actions to be taken when inclement weather occurs, such as ice, snow, and severe storm damage.
Hazard(s) Addressed:	Multiple
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	State or local money
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: The county addresses inclement weather through the media and websites. However an official plan is not in plan and the need to implement one due to tourists in the area is recognized.

Mitchell County Mitigation Action 39		Protect Critical Facilities
Hazard(s) Addressed:	Multiple	
Category:	Property Protection	
Priority (High, Moderate, Low):	High	
Lead Agency/Department Responsible:	Engineering with support from EMS, Utility Companies, Hospital, NCDOT	
Estimated Cost:	Unknown	
Potential Funding Sources:	Federal, State, local, and private funding sources	
Implementation Schedule:	Ongoing	
Implementation Status:	Ongoing: Critical Facilities are protected to the greatest degree possible.	
Additional Notes:	Critical facilities are essential to the health, safety and viability of a community. These are the buildings, services, and utilities without which residents and businesses cannot survive for long, such as hospitals, police stations, fire stations and sewage treatment plants. Therefore, the security of these facilities is imperative to ensure the public's health and safety in the aftermath of a hazard event. Steps that communities can take to better protect their critical facilities include such measures as retrofitting, relocation and acquisition. While considering the protection of these facilities, a multi hazard approach should be taken.	

Mitchell County Mitigation Action 40		Use acquisition as a strategy if there are signs of repetitive losses or the reviewed flood maps show intensive construction on flood prone areas.
Hazard(s) Addressed:	Multiple	
Category:	Property Protection	
Priority (High, Moderate, Low):	High	
Lead Agency/Department Responsible:	Building Inspections, Planning Board Commission, FEMA	
Estimated Cost:	Varies	
Potential Funding Sources:	Federal, State, local and private funding sources	
Implementation Schedule:	Ongoing	
Implementation Status:	The county has bought out some properties, such as the Bakersville Fire Department and residential homes. The county will continue to use this strategy as means to reduce repetitive loss properties.	

Mitchell County Mitigation Action 41	Consider relocation as strategy for mitigation
Hazard(s) Addressed:	Multiple
Category:	Property Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections, Planning Board Commission, FEMA
Estimated Cost:	Varies
Potential Funding Sources:	Federal, State, local and private funding sources
Implementation Schedule:	Ongoing
Implementation Status:	The county has relocated some properties, such as the Sheriff's Department in the past. The county will continue to use this strategy as means to reduce flood losses.
Additional Notes:	Relocation means moving a building or facility to a less hazard-prone area, either within the same parcel or on a new parcel. This technique is typically used to avoid coastal or riverine flood hazards. "Relocation" can also be used to describe the process of demolishing a building and reconstructing it outside the hazard area.
	One way to make relocation work is to adopt what Pilkey et al. call a 10/100-year relocation plan. Under this approach, a community develops a relocation strategy for its hazard-prone structures within 10 years, then implements that plan over the ensuing 100 years. Issues that need to be addressed in the planning stage include: cost-benefit comparisons of relocating structures intact or rebuilding; and whether buildings can be relocated on the same property or if new property must be acquired. Mobile homes and manufactured housing have been shown to be highly vulnerable to floods and should not be located in the floodplain. Where such housing can be relocated, this step should be taken. Communities may wish to require a bond against the damage to public streets and utilities incurred during a move.

Mitchell County Mitigation Action 42	Provide advanced training to enhance the knowledge, experience and dedication of staff on the local inspections team.
Hazard(s) Addressed:	Multiple
Category:	Property Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Building Inspections
Estimated Cost:	Minimal
Potential Funding Sources:	State and local sources
Implementation Schedule:	Ongoing, throughout the year
Implementation Status:	Ongoing: County Building Inspectors are required to maintain state accreditation which means staying up to date with trainings and knowledge. These trainings are not provided by the county. In the future, this action will be amended to reflect this information.
Additional Notes:	Well-trained inspectors are more likely to recognize building practices that are suspect with regard to hazard resilience, and can pass on their expertise to junior staff, thereby fostering a tradition of sustainable education within the inspections department.
	Brief training sessions could be provided to county inspectors who are working on local projects, to ensure that these supplemental staff are aware of local codes that are more stringent than county or state codes (such as free-board requirements).
	This method is one of the best alternatives to structural mitigation measures. By training building inspectors it is possible to tailor solutions for each home separately and come up with more economical and sound solutions than imposing change by regulations to all existing units.

Mitchell County Mitigation Action 43	Develop shelters in mobile home parks.
Hazard(s) Addressed:	Multiple
Category:	Property Protection
Priority (High, Moderate, Low):	Not determined in previous plan
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Not determined in previous plan
Potential Funding Sources:	Not determined in previous plan
Implementation Schedule:	Not determined in previous plan
Implementation Status:	This action will be deleted. There are no mobile home parks in Mitchell County.

Mitchell County Mitigation Action 44		Mandate tie-downs on propane tanks and mobile homes.
Hazard(s) Addressed:	Multiple	
Category:	Property Protection	
Priority (High, Moderate, Low):	Moderate	
Lead Agency/Department Responsible:	Building Inspections, NCDENR	
Estimated Cost:	Minimal	
Potential Funding Sources:	Federal, state, local, and private sources	
Implementation Schedule:	ongoing	
Implementation Status:	Ongoing: Mobile Homes that are on wheels (not a fixed foundation) are required to have tie-downs through the County's Floodplain Ordinance. Fixed mobile homes and trailers and propane tanks are not required to have tie-downs at this time.	
Additional Notes:	Propane tanks and mobile homes should be mandated with standard tie-downs to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards. Due to inexpensive land values, mobile homes are often located in floodplains; elevated mobile homes are at an increased risk of wind uplift and should be securely attached to foundation. Enforcement of a tank tie-down ordinance may need to be coordinated with the State Agriculture Department. However, even with tie-downs, residents should not remain in mobile homes during severe storms.	

Mitchell County Mitigation Action 45		Development regulations that provide guidelines for future settlement should be revised from an emergency management point of view.
Hazard(s) Addressed:	Multiple	
Category:	Property Protection	
Priority (High, Moderate, Low):	Moderate	
Lead Agency/Department Responsible:	Board of Commissioners, building inspections	
Estimated Cost:	Minimal	
Potential Funding Sources:	Local funds	
Implementation Schedule:	Ongoing, long-term	
Implementation Status:	Ongoing: The floodplain ordinance considers some of these issues. However, a future subdivision ordinance would best address these issues, taking into account, street interconnectivity, width, and slope steepness when permitting development.	

Mitchell County Mitigation Action 46	Consider acquiring (or not selling) parcels of land in hazard areas to conserve or restore as parks, in order to reduce the number of structures and infrastructure elements vulnerable to natural hazards.
Hazard(s) Addressed:	Flood
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Board of Commissioners
Estimated Cost:	Varies
Potential Funding Sources:	Federal, state, and local sources
Implementation Schedule:	Ongoing
Implementation Status:	Mitchell County has been successful in completing this action in the past. The County continues to pursue acquisition projects such as the mills along the streams in Mitchell County. This action is largely disaster driven since a disaster declaration results in money that is necessary to complete this action (such as HMGP). In Mitchell County, property of this nature would be deeded to the county where it would be a green space.
Additional Notes:	This approach would also be a solution to the recreational area need for the county.

Mitchell County Mitigation Action 47	Wetland Restoration
Hazard(s) Addressed:	Multiple
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	Not determined in previous plan
Lead Agency/Department Responsible:	NCDNR
Estimated Cost:	Not determined in previous plan
Potential Funding Sources:	Not determined in previous plan
Implementation Schedule:	Not determined in previous plan
Implementation Status:	This action will be deleted as there are no wetlands in Mitchell County.
Additional Notes:	<p>Wetlands are areas that are cyclically inundated with water. These ecosystems are essential habitats for a variety of species of fish and wildlife. Wetlands have been shown to be an effective pollutant filter. Wetlands also act as natural flood controls by storing tremendous amounts of floodwaters and slowing and reducing downstream flows.</p> <p>Wetlands can serve many environmental purposes in addition to providing flood mitigation, including providing habitat and filtering pollution. As a result, the number of funding sources available for wetlands acquisition or restoration may be greater than those dedicated to mitigation purposes. Typical restrictions on activities in wetlands include the prohibition of or limits to filling or dredging. Some jurisdictions allow the use of fill to elevate existing buildings at the edge of the floodplain.</p>

SECTION 9: MITIGATION ACTION PLAN

Mitchell County Mitigation Action 48	Routinely clear tree limbs hanging in the right-of-way to prevent trees from damaging utility wires during high wind events.
Hazard(s) Addressed:	Multiple
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	NC Department of Transportation, Utilities and Electric Co-Ops
Estimated Cost:	Varies
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	This action will likely be deleted in the future as the county does not manage tree removal. This action is completed of by NCDTO and the utilities in the area.
Additional Notes:	Due to the high density of forested area in the county and the increasing rate of development near or into forested areas, doing tree limb removal is of great importance. By definition, it is to clear routinely tree limbs hanging in the right-of-way to prevent trees from damaging utility wires during high wind events. Nationwide, falling trees and swinging tree limbs are the greatest source of power outages. In addition, tree limbs entangled in a frayed and sparking electrical wire create the perfect condition for an uncontrolled fire. While performing tree limb removal, take care not to trim more than necessary to avoid denying citizens the shade and beauty that a full tree offers.

Mitchell County Mitigation Action 49	Complete a Natural Resource Protection Plan
Hazard(s) Addressed:	Multiple
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	US Forestry Service, NC Forestry Commission
Estimated Cost:	25,000
Potential Funding Sources:	State and local sources
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: The County completed a Recreation Plan that covers natural areas in the county. The NC Forestry Commission and US Forestry Service manage forests in the area.
Additional Notes:	The county does not have a natural resource protection plan as the forests are mostly under federal protection. Still, it is important to integrate their procedures into the local response procedures to be more efficient in case of an emergency.

Mitchell County Mitigation Action 50	Raise Low-Lying Bridges or install culverts
Hazard(s) Addressed:	Multiple
Category:	Structural Project
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Engineering with support from NCDOT, FEMA
Estimated Cost:	\$25,000 cap for state funds
Potential Funding Sources:	State and private sources
Implementation Schedule:	When a bridge is scheduled for replacement or following a disaster that destroy the bridge.
Implementation Status:	Ongoing: Bridges in the County are state or privately maintained (the county has none). Following a disaster that destroys a bridge, the state may provide a maximum of \$25,000 to replace the bridge. In this case, private funds are often necessary to remedy the bridge as the cost exceeds the funds received.
Additional Notes:	Raising low-lying bridges will decrease the likelihood that large objects carried by floodwaters to lodge against a bridge and subsequently dam the river course. Of particular concern are fallen trees, which, when swept into a river and snagged by a bridge, can quickly capture floating debris, potentially, forming a solid dam. As a result, areas upstream and adjacent to the unintended dam can receive flood levels unanticipated by hazard mapping and risk assessments. Finally, under the weight of a newly formed reservoir, the bridge may tear from its foundation, allowing a destructive wall of water to rush downstream.

Mitchell County Mitigation Action 51	Routinely clean debris from the support bracing underneath low-lying bridges.
Hazard(s) Addressed:	Multiple
Category:	Natural Resource Protection
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Core of Engineers
Estimated Cost:	Varies
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	This action will likely be deleted in the future as the county does not manage debris removal.

Mitchell County Mitigation Action 52		Routinely clean and repair storm water drains to avoid unnoticed clogs that may hamper the efficiency of the storm water system.
Hazard(s) Addressed:		Multiple
Category:		Structural Project
Priority (High, Moderate, Low):		Low
Lead Agency/Department Responsible:		Maintenance, Utilities Companies
Estimated Cost:		\$25,000
Potential Funding Sources:		Local and private sources
Implementation Schedule:		Long-term
Implementation Status:		Deferred: This action is not relevant to the county at this time as stormwater is not an issue for the county. However, issues may arise in the future, deeming this action relevant.
Additional Notes:		<p>Drains are the major entryways into the storm water system and the filters of large floating debris. When drain covers are broken or clogged, the storm water system does not function well and localized flooding is possible.</p> <p>Services announcements via utility bills can recruit citizens as surveillance of the drains in their respective neighborhoods, as well as remind them that poor storm water collection can lead to flooded yards and basements. The task of inspection and maintenance, particularly of remote drains, could be on the monthly schedule of the public work staff, with a special round of drains inspections after major storm events.</p>

Mitchell County Mitigation Action 53		Create a Repetitive Loss Plan that identifies repetitive loss structures and mitigation measures
Hazard(s) Addressed:		Multiple
Category:		Structural Project
Priority (High, Moderate, Low):		High
Lead Agency/Department Responsible:		NFIP, NCEM, Board of Commissioners, Building Inspections
Estimated Cost:		Unknown
Potential Funding Sources:		Federal, state, and private sources
Implementation Schedule:		Ongoing
Implementation Status:		Completed: The county's floodplain management plan identifies the six properties totaling 15 losses in the county (completed with federal information from the NFIP). The county has commitment to reducing flood losses and will acquire repetitive loss properties as the opportunity arises.
Additional Notes:		<p>It is very frequent that a part of the losses suffered through different disasters happens in specific places; places that are vulnerable for different reasons (i.e. location, construction or other specific reason) and will continue to endure loss unless taken care of. A plan identifying these structures should be made and their specific reasons should be investigated. From that analysis, the county can decide on a method to mitigate loss for them. A repetitive loss plan is probably one of the best, quickest and most guaranteed methods of mitigation as it deals directly with a recurring problem.</p>

SECTION 9: MITIGATION ACTION PLAN

Mitchell County Mitigation Action 54	Develop a Community Awareness Program to educate citizens on hazard threats and mitigation.
Hazard(s) Addressed:	All Hazards
Category:	Public Information
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners
Estimated Cost:	Minimal
Potential Funding Sources:	Local and private sources
Implementation Schedule:	Ongoing
Implementation Status:	The county typically defers to the Red Cross and local county websites (which link to state websites) to disseminate information regarding hazard threats. The county may look into providing specific county information regarding hazard threats in the future through media, flyers, and on utility bills.

Mitchell County Mitigation Action 55	Place Flood level signs in the HMGP “buyout” areas.
Hazard(s) Addressed:	Flood
Category:	Public Information
Priority (High, Moderate, Low):	Not determined in previous plan
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners
Estimated Cost:	Not determined in previous plan
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Not determined in previous plan
Implementation Status:	This action will be deleted in the future as no such areas exist in the county.
Additional Notes:	These signs will clearly indicate the level of past floods in these locations. The signs will assist residents and would be buyers in the adjacent areas to be aware of the flooding potential of the area and take appropriate precautions.

Mitchell County Mitigation Action 56		Use the County's website to notify residents and other about flood hazard areas.
Hazard(s) Addressed:	Flood	
Category:	Public Information	
Priority (High, Moderate, Low):	High	
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners	
Estimated Cost:	Minimal	
Potential Funding Sources:	Local sources	
Implementation Schedule:	Ongoing	
Implementation Status:	Completed/Ongoing: The county's website site links to floodplains maps (DFIRMS) for the county. Updated maps will be posted to the website as needed.	
Additional Notes:	Flood maps can be placed on the County's web site along with key sections of the Hazard Mitigation Plan. Visitors to the web site will be able to pull up maps of properties within the County's jurisdiction showing the boundaries of the floodplains. Excerpts from the Plan will provide additional information about the County's Hazard Mitigation Plan.	

Mitchell County Mitigation Action 57		Prepare the community for disaster response.
Hazard(s) Addressed:	Multiple	
Category:	Public Information	
Priority (High, Moderate, Low):	Moderate	
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners	
Estimated Cost:	Minimal	
Potential Funding Sources:	Federal, state, and private sources (lowes, home depot)	
Implementation Schedule:	Ongoing	
Implementation Status:	Ongoing: Currently, this is predominately completely through the volunteer fire department. In the past, the county attempted to initiate a CERT, but the program was not successfully started due to turn over in the county. A CERT may be investigated in the future. Other options, such as having emergency response officials work with church groups may be investigated in the future.	
Additional Notes:	Another goal to reach with awareness programs is to prepare the community to respond to disasters. Many different programs such as Community Emergency Response Team (CERT) have been initiated countrywide and even if there is no such direct need as to start a training program in Mitchell County. Basic concepts and information can be passed to community members through different means: Flyers, Series of writing in the local newspaper, Ads in most frequented places (downtown stores, schools, churches, etc), and Using water bills to convey short messages.	

Mitchell County Mitigation Action 58	Develop a disaster warning system (an emergency broadcast system (local radio, television channel, and website), a siren system, a mobile public address systems and/or a door-to-door contact).
Hazard(s) Addressed:	Multiple
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office with support from the Planning Office
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	Completed/Ongoing: At the local level, Mitchell County uses the Code Red program which sends a message to each resident's phone or email. There is also a reverse 911 system, door-to-door operations, and the Fire trucks are equipped with PA Speakers. There is also a statewide program in place. These programs will be updated as needed.
Additional Notes:	<p>The first step in responding to a potential disaster is to know that one is coming. Disaster warning refers to both the monitoring of local conditions and the broadcasting of pre-event alerts.</p> <p>These assets need to be prioritized and one official warning system should be publicized. This does not mean that the county would rely only on that one, but rather would form a focus for the community to access information in times of need.</p>

Mitchell County Mitigation Action 59	Identify and strengthen facilities that would be used as emergency shelters.
Hazard(s) Addressed:	Multiple
Category:	Public Information
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Planning with support from the Office of Emergency Management
Estimated Cost:	Unknown, project dependent
Potential Funding Sources:	Federal (homeland security grants, etc), state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: Churches have also been identified as shelters in the area. These facilities can be strengthened to better meet sheltering needs as funding becomes available. The quick-connect program through homeland security money ensures that at least one shelter in the county has a quick connect generator switch. Mitchell County was in the process of identifying the best shelter locations for this while this plan was being prepared.
Additional Notes:	Mitchell County has identified the schools as emergency shelters. The large number of churches and their wide dispersion within the county make them a good candidate for becoming shelters. Several can be chosen as alternative shelters to be used in case of a mass casualty event and those structures can be upgraded to meet necessary standards.

Mitchell County Mitigation Action 60	Identify and/or relocate endangered public food banks to hazard-safe structures.
Hazard(s) Addressed:	Multiple
Category:	Public Information
Priority (High, Moderate, Low):	Low
Lead Agency/Department Responsible:	Planning with support from the Office of Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Not determined in previous plan
Implementation Status:	There is no food bank in Mitchell County. Therefore, this action will be deleted in future plan updates.
Additional Notes:	This will ensure that food storage and distribution remains operations during hazard events.

Mitchell County Mitigation Action 61	Identify Assembly Points
Hazard(s) Addressed:	Multiple
Category:	Public Information
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Planning with support from the Office of Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Completed
Implementation Status:	Completed: County officials (and appropriate officials from each locations) have completed identified assembly points for each high school (through the safe schools program), Hospital, and Unimen (a local business with hazardous materials on site). No additional assembly points have been identified. This may be revisited in the future if needed.
Additional Notes:	<p>The concept of assembly point differs from emergency shelter in the way that they are for a short period of time. The aim here is to take people away from danger as quick as possible and to account for them. An assembly point is generally in open air, at a location that can be reached easily, away from different potential source of dangers and big enough to contain large number of people for a short time period. These can be indicated by a simple painted sign on the ground but should be publicized. They can be used in residential areas prone to earthquake or wild fire and people would meet there first to account for the community and possible missing persons needing to be rescued. They would then either proceed back to their job/home/etc or go to a shelter/hospital for further care.</p> <p>The essential issue in assembly points is to extract as many people as quick as possible from the danger zone by gathering them in predefined locations, account for them and make preliminary assessment of the situation's gravity. Each assembly point should be assigned a supervisor that is living or working in that region and knows the community at a certain extent.</p> <p>Assembly points can be a safe spot away from buildings, a recreational area or a park. Places that have other purposes in everyday use. And they need not to be everywhere but, rather where high concentration of people occur (downtown area, mobile home park, schools, etc).</p>

Mitchell County Mitigation Action 62	Integrate technology into Mitchell County Emergency Management
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners
Estimated Cost:	Minimal to several thousand dollars
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	Ongoing: To date, Mitchell County has implemented the inter-gov system, allowing county maps and flood maps to be viewed remotely; an address database; and is moving towards GIS. Additional improvements will be incorporated as funding and opportunities become available.
Additional Notes:	Municipal and other computer systems and networks for use in mitigation and response efforts can be linked together to better share information, be more coordinated in times response and benefit from a more efficient and effective use of resources. The essential point is that those integrated systems would probably not make a great difference in the everyday emergency operations but will have a huge impact should any large scale incident occur. Those County computer systems would collect and process hazard data in order to provide information on hazard mitigation opportunities and to assist in disaster response and recovery efforts. There are numerous computer software products on the market or in development that could be used to integrate multiple data sources and assess the data collected. An example to these data programs is the GIS (Geographical Information System) that divides community into layers (topographic, residential, infrastructure, etc) and can, thus, be used for many different purposes.

Mitchell County Mitigation Action 63	Identify response equipment that needs to be replaced or upgraded.
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office
Estimated Cost:	Varies by project, averaging several thousand dollars
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing, monitored continuously.
Implementation Status:	Ongoing: Mitchell County Emergency Management continues to watch for grants in order to upgrade and replace equipment as the need and funding become available. However, there is no specific process in place which may be enacted in the future. Recently, a bus was replaced with a mobile command truck. Cabinets were also added to a trailer with Department of Homeland Security Money.
Additional Notes:	Interviews with local authorities have shown an obvious need for response equipment. Although the technology upgrade described above can also be considered as equipment buyout, what is meant here is response equipment to be used on the field. The needs should be identified and a proposal for a grant can be developed accordingly.

Mitchell County Mitigation Action 64	Start public/citizen emergency management and involvement initiatives as the County most likely lacks funds to support new responder posts and risk having its existing capacity overwhelmed should an event of large scale occur.
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners; Local volunteer fire department
Estimated Cost:	Low
Potential Funding Sources:	Local and private sources
Implementation Schedule:	Ongoing
Implementation Status:	This action is largely completed through the volunteer fire department, off-duty police officers, amateur radio groups, and church groups. In the future, county officials may work to implement a more formal training program.

Mitchell County Mitigation Action 65	Designate volunteer local coordinators in small communities that does not have a Fire or Police station.
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners
Estimated Cost:	unknown
Potential Funding Sources:	Federal, state, local and private sources
Implementation Schedule:	Complete
Implementation Status:	COMPLETED: All areas of the county are covered by fire protection.
Additional Notes:	These individuals would be contact points and possibly information dissemination agents who would be used in case of an emergency that is overwhelming local response capacity.

Mitchell County Mitigation Action 66	The local Emergency Management Office should also develop Mutual Agreements of Understanding (MOU) with neighboring counties and regional organizations so that they can plan ahead to strengthen the regional capability at once.
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Emergency Management Office with support from the Board of Commissioners
Estimated Cost:	None
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Completed
Implementation Status:	COMPLETED: there are statewide MOUs as well as in Mitchell County and the municipalities.
Additional Notes:	Such a dialogue would permit them to plan for an efficient and effective use of funding available (i.e. avoid equipment duplication) and increase the overall response capacity of the region.

Mitchell County Mitigation Action 67	Strengthen Mass Causality Training throughout the county.
Hazard(s) Addressed:	Multiple
Category:	Emergency Services
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management Office
Estimated Cost:	Training exercises and planning (\$30,000)
Potential Funding Sources:	Federal, state, and private sources
Implementation Schedule:	Ongoing
Implementation Status:	The county continues to seek funding to strengthen mass causality training and overall emergency response. As funds become available, these activities will be completed.
Additional Notes:	Due to its relatively recent emergence, at least as a result of deliberate action, its high impact, and the lack of expertise that is involved due to its low frequency of occurrence, local response capacity to mass casualty incidents are behind expectations. While purchasing equipment would help partially, the essential point is to train the local responders about this specific and unique issue. Different training programs like the one offered from the Department of Justice are available at this regard and county officials can obtain further information about standards, program contents and financial issues from federal organizations such as the Department of Homeland Security or the Department of Justice.

Mitchell County Mitigation Action 68	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Emergency Management Office
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Bakersville Mitigation Action Plan

Bakersville Mitigation Action 1	Adopt policies that discourage growth in flood hazard areas, including policy on not extending public services and utilities into flood hazard zones.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Public Works, Zoning Enforcement Officer
Estimated Cost:	None
Potential Funding Sources:	Local funds
Implementation Schedule:	Ongoing
Implementation Status:	NEW: The jurisdictions in Mitchell County are responsible for permitting and extending public services. The jurisdictions are committed to not extending public services into flood zones per their zoning ordinances and the county floodplain ordinance.

Bakersville Mitigation Action 2	Develop a community awareness program to education the citizens of Bakersville on hazard risks.
Hazard(s) Addressed:	All
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Board, team with County Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	State and local sources
Implementation Schedule:	Short term
Implementation Status:	NEW

Bakersville Mitigation Action 3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Board, team with County Emergency Management
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Spruce Pine Mitigation Action Plan

Spruce Pine Mitigation Action 1	Adopt policies that discourage growth in flood hazard areas, including policy on not extending public services and utilities into flood hazard zones.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Town Board, planning
Estimated Cost:	None
Potential Funding Sources:	Local funds
Implementation Schedule:	Ongoing
Implementation Status:	NEW: The jurisdictions in Mitchell County are responsible for permitting and extending public services. The jurisdictions are committed to not extending public services into flood zones per their zoning ordinances and the county floodplain ordinance.

Spruce Pine Mitigation Action 2	Develop a community awareness program to education the citizens of Spruce Pine on hazard risks.
Hazard(s) Addressed:	All
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Board, team with County Emergency Management
Estimated Cost:	Minimal
Potential Funding Sources:	State and local sources
Implementation Schedule:	Short term
Implementation Status:	NEW

Spruce Pine Mitigation Action 3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Board, team with County Emergency Management
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

YANCEY COUNTY MITIGATION ACTION PLAN

Yancey County Mitigation Action 1	Purchase and install a generator for use at the Yancey County Emergency Operations Center.
Hazard(s) Addressed:	Winter Storms, Flood, Severe Thunderstorms and Tornadoes, Hurricanes and Tropical Storms, and Other Hazards
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	\$17,000
Potential Funding Sources:	A grant has been applied for through North Carolina Emergency Management (Mitigation Section) — status of funding is pending
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	COMPLETED

Yancey County Mitigation Action 2	Purchase and install a generator for use at the Burnsville Elementary School, which is used as a shelter facility.
Hazard(s) Addressed:	Winter Storms, Flood, Severe Thunderstorms and Tornadoes, Hurricanes and Tropical Storms, and Other Hazards
Category:	Emergency Services
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	\$17,000
Potential Funding Sources:	A grant has been applied for through North Carolina Emergency Management (Mitigation Section) — status of funding is pending
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Underway: The Burnsville School Shelter Location Has been Equipped with a disconnect switch to allow for the use of a generator.

Yancey County Mitigation Action 3	Establish a flood damage prevention program for crops, in particular for the Cane River Township area along streams.
Hazard(s) Addressed:	Flood
Category:	Programs
Priority (High, Moderate, Low):	Moderate Low
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Undetermined
Potential Funding Sources:	United States Department of Agriculture funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Incomplete: Due to the reduction of tobacco productions in Yancey County post 2004, the necessity for a crop damage prevention program has become a low priority.

SECTION 9: MITIGATION ACTION PLAN

Yancey County Mitigation Action 4	Establish program to address the protection and/or preservation of historic (Civil War-era) properties on the Toe River.
Hazard(s) Addressed:	Flood
Category:	Programs
Priority (High, Moderate, Low):	Moderate Low
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Undetermined
Potential Funding Sources:	National Trust for Historic Preservation's Preservation Services Fund; Historic Preservation fund through the National Park Service
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Incomplete: Due to the lack of significant historical evidence along the Toe River this action has been deemed a low priority.

Yancey County Mitigation Action 5	Preservation of vital governmental records (such as those located in the Yancey County Register of Deeds Office) by ensuring that records are kept in areas of buildings not subject flooding, in areas of buildings away from glass windows, in locked cabinets to prevent tipping and damage, or by storing duplicate records at locations in low risk areas.
Hazard(s) Addressed:	Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Undetermined
Potential Funding Sources:	Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	COMPLETED: Vital government record has been secured in the register of deeds office by eliminating windows in the room and proper maintenance of the records vault.

Yancey County Mitigation Action 6	Secure computers, shelves, windows, lighting, etc. in schools, local government buildings, etc. within the county with respect to seismic activity.
Hazard(s) Addressed:	Earthquakes, Other Hazards
Category:	Prevention
Priority (High, Moderate, Low):	Moderate Low
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Undetermined
Potential Funding Sources:	Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Incomplete: Due to the large amount of shelves in our school system, funding has been slow and this action has now been placed on a low priority list.

SECTION 9: MITIGATION ACTION PLAN

Yancey County Mitigation Action 7	Install a brochure rack in the Yancey County Courthouse to hold FEMA, American Red Cross, and other free disaster-related publications for use by the public.	
Hazard(s) Addressed:	Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards	
Category:	Public Information and Awareness	
Priority (High, Moderate, Low):	Moderate	
Lead Agency/Department Responsible:	Yancey County Emergency Management	
Estimated Cost:	Less than \$500 for the installation of the brochure rack. All publications distributed will be those available at no cost.	
Potential Funding Sources:	Internal funds	
Implementation Schedule:	Within the next six to 12 months	
Implementation Status:	COMPLETED (2005)	

Yancey County Mitigation Action 8	Reinforce repeater sites and other communications towers and antennas to withstand greater winds, lightning strikes, and ice storms.	
Hazard(s) Addressed:	Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards	
Category:	Property Protection/Emergency Services	
Priority (High, Moderate, Low):	Moderate	
Lead Agency/Department Responsible:	Yancey County Emergency Management	
Estimated Cost:	Undetermined	
Potential Funding Sources:	Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds	
Implementation Schedule:	As soon as possible pending funding	
Implementation Status:	COMPLETED (2004)	

Yancey County Mitigation Action 9	Implement inter-operable communications system.	
Hazard(s) Addressed:	Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards	
Category:	Emergency Services	
Priority (High, Moderate, Low):	Low	
Lead Agency/Department Responsible:	Yancey County Emergency Management	
Estimated Cost:	> \$1 million	
Potential Funding Sources:	Department of Homeland Security funds	
Implementation Schedule:	As soon as possible pending funding	
Implementation Status:	Ongoing: New EMS Radio, new Viper Radio have been installed, generator has been installed for our 911 center, and the EOC is wired for internet.	

Yancey County Mitigation Action 10	Evaluate and enhance as necessary the Yancey County Flood Damage Prevention Ordinance, in part to ensure that the ordinance continues to address new buildings and infrastructure.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Internal administrative costs only
Potential Funding Sources:	General funds
Implementation Schedule:	2005-2009
Implementation Status:	COMPLETED: In June 2009, Yancey County adopted a Flood Damage Prevention Ordinance

Yancey County Mitigation Action 11	Implement enhanced security measures at the Yancey County Courthouse to include security cameras and the appropriate securing of all entrances and exits (Phase 1).
Hazard(s) Addressed:	Terrorism, Civil Disruption / Disobedience
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	\$15,000
Potential Funding Sources:	Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Ongoing: The county has implemented a comprehensive video surveillance system throughout the courthouse with 24 hour monitoring by the sheriff's department.

Yancey County Mitigation Action 12	Implement enhanced security measures in the Yancey County Courthouse's Courtroom to include metal detectors/wands and the elimination of non-essential entrances/exits (Phase 2).
Hazard(s) Addressed:	Civil Disruption/ Disobedience
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	\$10,000
Potential Funding Sources:	Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	Incomplete: Due to the inability to secure a funding source, the courthouse has been unable to complete this action item.

Yancey County Mitigation Action 13	Implement enhance security measures at the new EMS facility
Hazard(s) Addressed:	Civil Disruption/ Disobedience
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	\$10,000
Potential Funding Sources:	Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	COMPLETED

Yancey County Mitigation Action 14	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

Town of Burnsville Mitigation Action Plan

Town of Burnsville Mitigation Action 1a	Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding.
Hazard(s) Addressed:	Elevation
Category:	Flood
Priority (High, Moderate, Low):	Property Protection
Lead Agency/Department Responsible:	Low
Estimated Cost:	Burnsville Public Works
Potential Funding Sources:	\$3,000,000
Implementation Schedule:	Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program
Implementation Status:	Incomplete due to lack of funding.

Town of Burnsville Mitigation Action 1b	Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding.
Hazard(s) Addressed:	Relocation
Category:	Flood
Priority (High, Moderate, Low):	Property Protection
Lead Agency/Department Responsible:	Low
Estimated Cost:	Burnsville Public Works
Potential Funding Sources:	\$4,500,000
Implementation Schedule:	Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program
Implementation Status:	Incomplete due to lack of funding.

Town of Burnsville Mitigation Action 2	Install a brochure rack in the Town of Burnsville Town Hall to hold FEMA, American Red Cross, and other free disaster-related publications for use by the public.
Hazard(s) Addressed:	Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards
Category:	Public Information and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management
Estimated Cost:	Less than \$500 for the installation of the brochure rack. All publications distributed will be those available at no cost.
Potential Funding Sources:	Internal funds
Implementation Schedule:	Within the next six to 12 months
Implementation Status:	COMPLETED

Town of Burnsville Mitigation Action 3	Evaluate and enhance as necessary the Town of Burnsville Flood Damage Prevention Ordinance, in part to ensure that the ordinance continues to address new buildings and infrastructure.
Hazard(s) Addressed:	Flood
Category:	Prevention
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Council
Estimated Cost:	Internal administrative costs only
Potential Funding Sources:	General funds
Implementation Schedule:	2005-2009
Implementation Status:	COMPLETED

Town of Burnsville Mitigation Action 4	Implement enhanced security measures at the Burnsville Town Hall to include security cameras and recorders.
Hazard(s) Addressed:	Civil Disruption/ Disobedience
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	\$5,000
Potential Funding Sources:	Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	COMPLETED

Town of Burnsville Mitigation Action 5	Implement enhanced security measures at the Burnsville water treatment plant to include security cameras and recorders.
Hazard(s) Addressed:	Civil Disruption/ Disobedience
Category:	Property Protection
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	\$5,000
Potential Funding Sources:	Department of Homeland Security funds
Implementation Schedule:	As soon as possible pending funding
Implementation Status:	COMPLETED

Town of Burnsville Mitigation Action 6	Continue to enforce the town's Flood Damage Prevention Ordinance to keep structures out of the floodplain.
Hazard(s) Addressed:	Flood
Category:	Property Protection, Prevention
Priority (High, Moderate, Low):	High
Lead Agency/Department Responsible:	Yancey County Emergency Management and the LEPC
Estimated Cost:	Minimal
Potential Funding Sources:	Federal, state, and local sources.
Implementation Schedule:	Ongoing
Implementation Status:	NEW

Town of Burnville Mitigation Action 7	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.
Hazard(s) Addressed:	All Hazards
Category:	Public Education and Awareness
Priority (High, Moderate, Low):	Moderate
Lead Agency/Department Responsible:	Town Council and Yancey County Emergency Management
Estimated Cost:	Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations
Potential Funding Sources:	None needed
Implementation Schedule:	Ongoing
Implementation Status:	This is a new mitigation action.

SECTION 10

PLAN MAINTENANCE PROCEDURES

44 CFR Requirement

44 CFR Part 201.6(c)(4)(i):

The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

44 CFR Part 201.6(c)(4)(ii):

The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section discusses how the Toe River Region Mitigation Strategy and Mitigation Action Plan will be implemented and how the Regional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following three subsections:

- 10.1 Implementation and Integration
- 10.2 Monitoring, Evaluation and Enhancement
- 10.3 Continued Public Involvement

10.1 IMPLEMENTATION AND INTEGRATION

Each agency, department or other partner participating under the Toe River Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific “lead” agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The counties in the Toe River Region will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant City and County government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of

the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP) will remain charged with ensuring that the goals and mitigation actions of new and updated local planning documents for their agencies or departments are consistent, or do not conflict with, the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in the Toe River Region.

Since the previous four plans were adopted in 2005 (Avery, Mitchell, Yancey Counties) and 2006 (McDowell County), each County and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances
- Integrating the mitigation plan into reviews and updates of County emergency operations plans
- Integrating the mitigation plan into review and updates of building codes
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the TRRHMP, individual county meetings, and the annual review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Regional Hazard Mitigation Plan is deemed by the Toe River Regional Hazard Mitigation Planning Committee to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.2 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

When determined necessary, the Toe River Regional Hazard Mitigation Planning Committee shall meet in March of every year to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the TRRHMP shall be documented in the form of a report that can be shared with interested City and County Council members. The TRRHMP will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within the Toe River Region which includes the counties of Avery, McDowell, Mitchell, and Yancey. The Mitchell County Emergency Management Coordinator will be responsible for reconvening the TRRHMP for these reviews.

Five (5) Year Plan Review

The Plan will be thoroughly reviewed by the TRRHMP every five years to determine whether there have been any significant changes in the Toe River Region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased

exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides Toe River county officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. The Mitchell County Emergency Management Coordinator will be responsible for reconvening the TRRHMP and conducting the five-year review.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Toe River Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCDEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Disaster Declaration

Following a disaster declaration, the Toe River Regional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the Mitchell County Emergency Management Coordinator to reconvene the TRRHMP and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

The results of the five-year review will be summarized by the TRRHMP in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, the Toe River county(s) will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to the North Carolina Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the TRRHMP for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the TRRHMP:

- There are errors, inaccuracies or omissions made in the identification of issues or needs in the Plan
- New issues or needs have been identified which are not adequately addressed in the Plan
- There has been a change in information, data, or assumptions from those on which the Plan is based

Upon receiving the recommendation from the TRRHMP and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the TRRHMP (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- Adopt the proposed amendments as presented
- Adopt the proposed amendments with modifications
- Refer the amendments request back to the TRRHMP for further revision, or
- Defer the amendment request back to the TRRHMP for further consideration and/or additional hearings

10.3 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement
44 CFR Part 201.6(c)(4)(iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the TRRHMP in local newspapers, public bulletin boards and/or County office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the TRRHMP

- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place
- Utilizing the Toe River county websites to advertise any maintenance and/or periodic review activities taking place, and
- Keeping copies of the Plan in public libraries

Appendix A: Plan Adoption

44 CFR Requirement

44 CFR Part 201.6(c)(5): The plan shall include documentation that the plan has been formally adopted by the local governing body of the jurisdiction requesting approval of the plan.

This section of the Plan includes a copy of the local adoption resolution passed by the participating jurisdictions in the Toe River Region:

Jurisdiction
Avery County
Banner Elk
Crossnore
Elk Park
Grandfather Village
Newland
Sugar Mountain
McDowell County
Marion
Old Fort
Mitchell County
Bakersville
Spruce Pine
Yancey County
Burnsville

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Avery County is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, Avery County desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Board of Commissioners to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Avery County; and

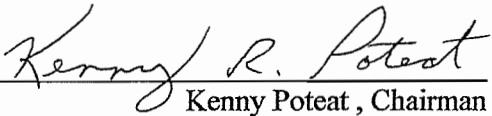
WHEREAS, Avery County, in coordination with, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

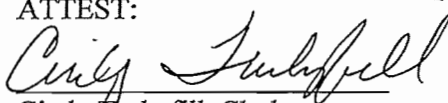
NOW, THEREFORE, BE IT RESOLVED that the Board of Commissioners of Avery County hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 4, 2011.


Kenny Poteat, Chairman
Avery County Board of Commissioners

ATTEST:


Cindy Turbyfill, Clerk

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Banner Elk is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Banner Elk desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Banner Elk; and

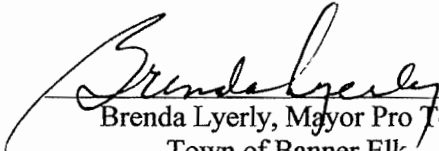
WHEREAS, Town of Banner Elk, in coordination with Avery County, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

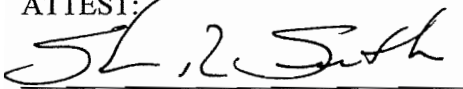
NOW, THEREFORE, BE IT RESOLVED that the Town Council of Banner Elk hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 11th, 2011.


Brenda Lyerly, Mayor Pro Tem
Town of Banner Elk

ATTEST:


Steve Smith , Clerk

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Crossnore is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Crossnore desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Grandfather Village; and

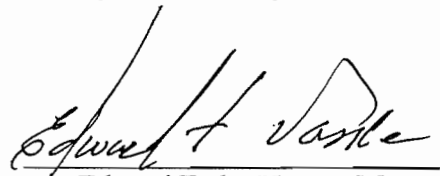
WHEREAS, the Town of Crossnore, in coordination with Avery County, Grandfather Village, Banner Elk, Newland, Elk Park, Sugar Mountain, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of Crossnore hereby:

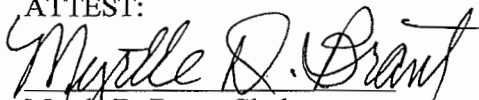
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on 4-20-, 2011.



Edward Tudor Vance, Mayor

ATTEST:



Myrtle D. Brant, Clerk

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Elk Park is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Elk Park desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Elk Park; and

WHEREAS, Town of Elk Park, in coordination with Avery County, Crossnore, Banner Elk, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

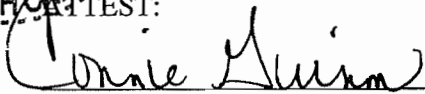
NOW, THEREFORE, BE IT RESOLVED that the Town Council of Elk Park hereby:

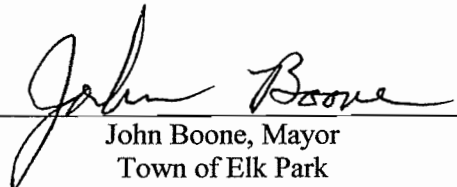
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 4, 2011.



ATTEST:


Connie Guinn, Clerk


John Boone, Mayor
Town of Elk Park

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Grandfather Village is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, Grandfather Village desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Grandfather Village; and

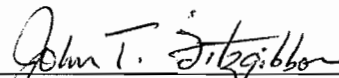
WHEREAS, Grandfather Village, in coordination with Avery County, Crossnore, Banner Elk, Newland, Elk Park, Sugar Mountain, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Grandfather Village hereby:

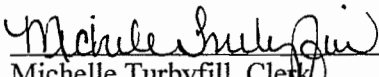
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on March 31, 2011.



John Fitzgibbon, Mayor
Grandfather Village

ATTEST:



Michelle Turbyfill, Clerk

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Newland is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Newland desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Newland; and

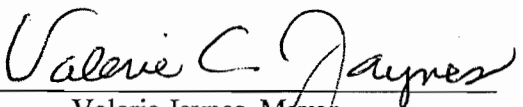
WHEREAS, Town of Newland, in coordination with Avery County, Crossnore, Banner Elk, Grandfather Village, Elk Park, Sugar Mountain, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of Newland hereby:

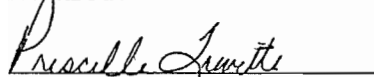
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on 4-5, 2011.



Valerie Jaynes, Mayor
Town of Newland

ATTEST:



Priscilla Trivette, Clerk

THE VILLAGE OF SUGAR MOUNTAIN

Sugar Mountain, North Carolina

R-2011.4

RESOLUTION TO ADOPT THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Village of Sugar Mountain is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Village of Sugar Mountain desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of Avery County to protect its citizens and property from the effects of natural hazard by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of Avery County to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Village of Sugar Mountain; and

WHEREAS, Village of Sugar Mountain, in coordination with Avery County, Crossnore, Banner Elk, Grandfather Village, Elk Park, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

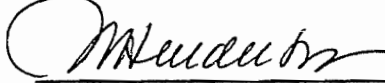
WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW THEREFORE, BE IT RESOLVED that the Village of Sugar Mountain here:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

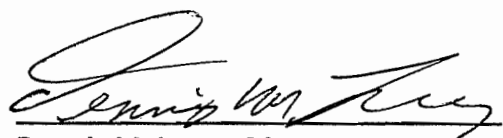
Duly adopted this the 19th day of April, 2011.

ATTEST:


Nancy L. Henderson, Clerk
Village of Sugar Mountain

(seal)




Dennis M. Lacey, Mayor
Village of Sugar Mountain

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, McDowell County is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, McDowell County desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the McDowell County Board of Commissioners to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the McDowell County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting McDowell County; and

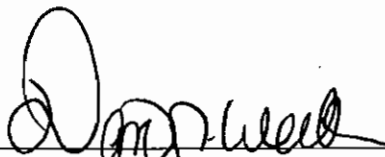
WHEREAS, McDowell County, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the McDowell County Board of Commissioners hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 11, 2011.



David N. Walker, Chair
McDowell County Board of Commissioners

ATTEST:



Carrie Padgett, Clerk



**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the City of Marion is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the City of Marion desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the City Council to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the City Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the City of Marion; and


WHEREAS, the City of Marion, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville, has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

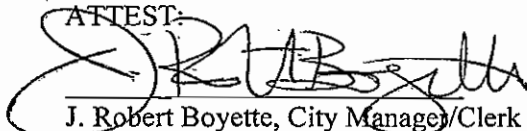
WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Marion hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted this the 17th day of May, 2011.


Stephen R. Little, Mayor

ATTEST:

J. Robert Boyette, City Manager/Clerk

RESOLUTION NUMBER: R-11-05-17-2

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Old Fort is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Old Fort desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Old Fort Board of Aldermen to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Old Fort Board of Aldermen to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Old Fort; and

WHEREAS, the Town of Old Fort, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Old Fort Board of Aldermen of the Town of Old Fort hereby:

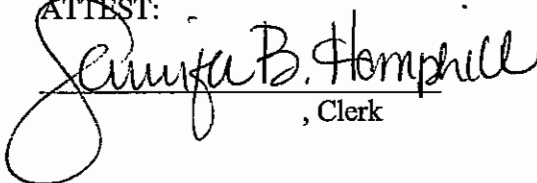
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 18th, 2011.



_____, Chair
Old Fort Board of Aldermen

ATTEST:


_____, Clerk



**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Mitchell County is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Mitchell County desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Mitchell County Board of Commissioners to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Mitchell County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Mitchell County; and

WHEREAS, Mitchell County in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

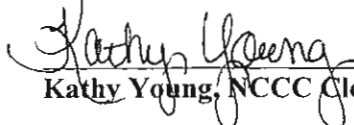
WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Mitchell County Board of Commissioners hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on this the 4th day of April 2011.

ATTEST:


Kathy Young, NCCC Clerk to the Board


Marvin Miller, Chairman

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Bakersville is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Bakersville desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Bakersville Town Council to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

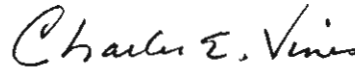
WHEREAS, it is also the intent of the Bakersville Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Bakersville, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Bakersville Town Council of Bakersville, North Carolina hereby:

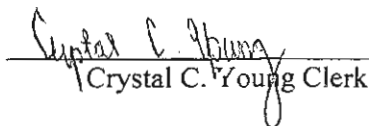
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 11, 2011



Charles E. Vines, Mayor
Town of Bakersville

ATTEST:


Crystal C. Young Clerk

**RESOLUTION TO ADOPT THE
TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Spruce Pine is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Spruce Pine desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Spruce Pine Town Council to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Spruce Pine Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Spruce Pine; and

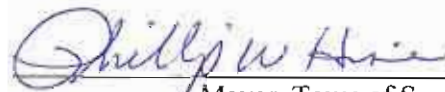
WHEREAS, Town of Spruce Pine, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of Spruce Pine, NC, hereby:


1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on 3 / 28, 2011.



Mayor, Town of Spruce Pine

ATTEST:


Clerk



RESOLUTION

TO ADOPT THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

WHEREAS, Yancey County is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Yancey County Board of Commissioners desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Yancey County Board of Commissioners to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Yancey County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Yancey County; and

WHEREAS, Yancey County, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

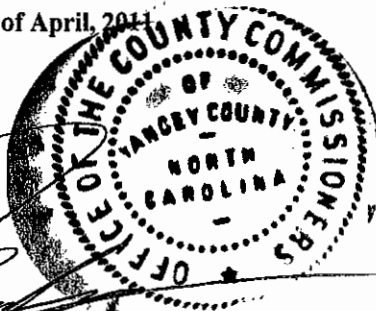
WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Board of Commissioners of Yancey County hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

ADOPTED this the 5th Day of April, 2011

(County Seal)



ATTEST:

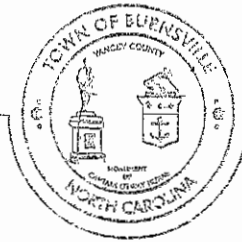
J. Jason Robinson,
Clerk to the Board of Commissioners

Johnny Riddle, Chairman
Yancey County Board of Commissioners

Danny McIntosh
Mayor

Jeanne Martin
Town Clerk

Town of Burnsville



Councillors:
Ruth L. Banks
Judy Buchanan
Doyce G. McClure
Ron Powell

RESOLUTION TO ADOPT THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Town of Burnsville is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Burnsville Town Council desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Burnsville Town Council to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Burnsville Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Burnsville, and

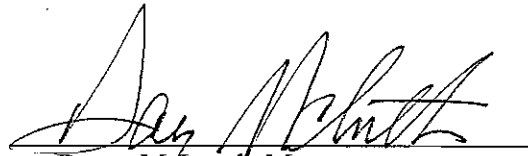
WHEREAS, the Town of Burnsville, in coordination with Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Marion, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County and Burnsville has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Burnsville hereby:

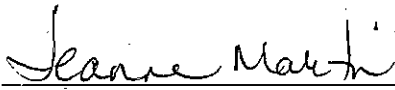
1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on March 31, 2011.

A handwritten signature in black ink, appearing to read "Danny McIntosh", written over a horizontal line.

Danny McIntosh, Mayor
Town of Burnsville

ATTEST:

A handwritten signature in black ink, appearing to read "Jeanne Martin", written over a horizontal line.

Jeanne Martin, CMC
Town Clerk

Appendix B: Planning Tools

This section of the Plan includes three (3) Items:

1. *A Blank Public Participation Survey*
2. *A Blank Capability Assessment Survey*
3. *Scoring Criteria for the Capability Assessment*

PUBLIC PARTICIPATION SURVEY FOR HAZARD MITIGATION PLANNING

We need your help!

The Counties of Avery, McDowell, Mitchell, and Yancey are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional *Hazard Mitigation Plan*. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional *Hazard Mitigation Plan* for the four-county region.

This survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

Please help us by completing this survey by March 13, 2010 and returning it to:

Jenny Noonkester, PBS&J
5200 77 Center Drive, Suite 500
Charlotte, NC 28217

Surveys can also be faxed to: (704) 525-2838 or emailed to jnoonkester@pbsj.com.

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan*, please contact PBS&J, planning consultant for the project. You may reach Nathan Slaughter (PBS&J) at 919-431-5251 or by email at nslaughter@pbsj.com.

1. Where do you live?

- | | |
|---|--|
| <input type="checkbox"/> Unincorporated Avery County | <input type="checkbox"/> Town of Old Fort |
| <input type="checkbox"/> Unincorporated McDowell County | <input type="checkbox"/> Town of Bakersville |
| <input type="checkbox"/> Unincorporated Mitchell County | <input type="checkbox"/> Town of Spruce Pine |
| <input type="checkbox"/> Unincorporated Yancey County | <input type="checkbox"/> Town of Burnsville |
| <input type="checkbox"/> Town of Banner Elk | <input type="checkbox"/> Other |
| <input type="checkbox"/> Town of Crossnore | |
| <input type="checkbox"/> Town of Elk Park | |
| <input type="checkbox"/> Town of Newland | |
| <input type="checkbox"/> Town of Sugar Mountain | |
| <input type="checkbox"/> Grandfather Village | |
| <input type="checkbox"/> City of Marion | |

2. Have you ever experienced or been impacted by a disaster?

- ☐ Yes
- ☐ No

a. If “Yes,” please explain:

3. How concerned are you about the possibility of our community being impacted by a disaster?

- ☐ Extremely concerned
- ☐ Somewhat concerned
- ☐ Not concerned

4. Please select the one hazard you think is the *highest threat* to your neighborhood:

- | | |
|--|--|
| <input type="checkbox"/> Acts of Terror | <input type="checkbox"/> Hurricane Remnants |
| <input type="checkbox"/> Dam / Levee Failure | <input type="checkbox"/> Land Subsidence |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Landslide |
| <input type="checkbox"/> Earthquake | <input type="checkbox"/> Lightning |
| <input type="checkbox"/> Expansive Soils | <input type="checkbox"/> Severe Winter/Ice Storm |
| <input type="checkbox"/> Extreme Heat | <input type="checkbox"/> Severe Thunderstorm / High Wind |
| <input type="checkbox"/> Flood | <input type="checkbox"/> Tornado |
| <input type="checkbox"/> Hailstorm | <input type="checkbox"/> Wildland Fire |

5. Please select the one hazard you think is the *second highest threat* to your neighborhood:

- | | |
|--|--|
| <input type="checkbox"/> Acts of Terror | <input type="checkbox"/> Hurricane Remnants |
| <input type="checkbox"/> Dam / Levee Failure | <input type="checkbox"/> Land Subsidence |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Landslide |
| <input type="checkbox"/> Earthquake | <input type="checkbox"/> Lightning |
| <input type="checkbox"/> Expansive Soils | <input type="checkbox"/> Severe Winter/Ice Storm |
| <input type="checkbox"/> Extreme Heat | <input type="checkbox"/> Severe Thunderstorm / High Wind |
| <input type="checkbox"/> Flood | <input type="checkbox"/> Tornado |
| <input type="checkbox"/> Hailstorm | <input type="checkbox"/> Wildland Fire |

6. Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

- ☐ Yes (please explain): _____
- ☐ No

7. Is your home located in a floodplain?

- ☐ Yes
- ☐ No
- ☐ I don't know

8. Do you have flood insurance?

- ☐ Yes
- ☐ No
- ☐ I don't know

a. If "No," why not?

- ☐ Not located in floodplain
- ☐ Too expensive
- ☐ Not necessary because it never floods
- ☐ Not necessary because I'm elevated or otherwise protected
- ☐ Never really considered it
- ☐ Other (please explain): _____

9. Have you taken any actions to make your home or neighborhood more resistant to hazards?

- ☐ Yes
- ☐ No

b. If "Yes," please explain:

10. Are you interested in making your home or neighborhood more resistant to hazards?

- ☐ Yes
- ☐ No

11. Do you know what office to contact regarding reducing your risks to hazards in your area?

- ☐ Yes
- ☐ No

12. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

- ☐ Newspaper
- ☐ Television
- ☐ Radio
- ☐ Internet
- ☐ Mail
- ☐ Public workshops/meetings
- ☐ School meetings
- ☐ Other (please explain): _____

13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.

Category	Very Important	Somewhat Important	Not Important
<u>1. Prevention</u> Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>2. Property Protection</u> Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>3. Natural Resource Protection</u> Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>4. Structural Projects</u> Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>5. Emergency Services</u> Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>6. Public Education and Awareness</u> Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

THANK YOU FOR YOUR PARTICIPATION!

This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):

Name: _____

Address: _____

Phone: _____ **E-Mail:** _____

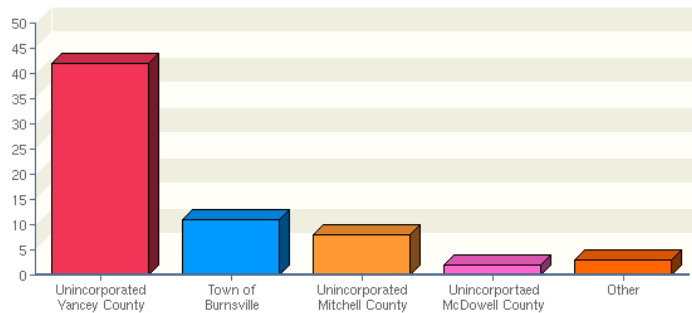

[www.surveygizmo](http://www.surveygizmo.com)

Report: Response Summary Report

Survey: Toe River Regional Hazard Mitigation Plan Survey

Compiled: 04/26/2010

1. Where do you live?



STATISTICS

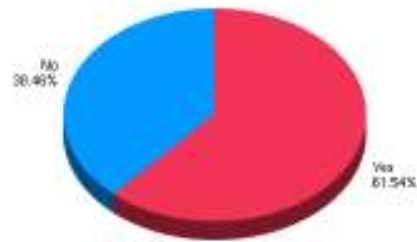
Choices Selected: 66

Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
Unincorporated Yancey County	42	63.64%
Town of Burnsville	11	16.67%
Unincorporated Mitchell County	8	12.12%
Unincorporated McDowell County	2	3.03%
Other	1	1.52%
Town of Bakersville	1	1.52%
Town of Spruce Pine	1	1.52%

Report from www.SurveyGizmo.com

2. Have you ever experienced or been impacted by a disaster?**STATISTICS**

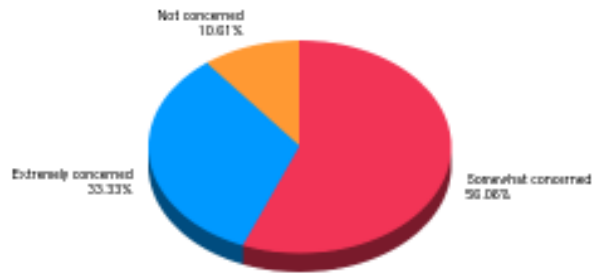
Choices Selected: 65

Total Responses: 65

SUMMARY

VALUE	COUNT	PERCENT %
Yes	40	61.54%
No	25	38.46%

Report from www.SurveyGizmo.com

3. How concerned are you about the possibility of our community being impacted by a disaster?**STATISTICS**

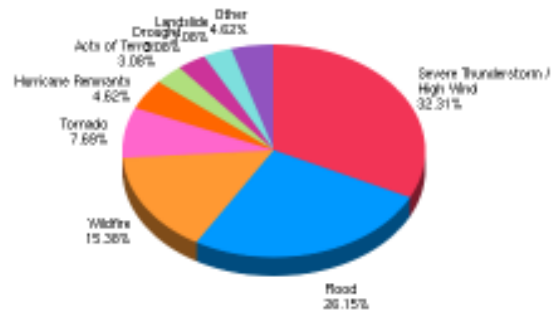
Choices Selected: 66
Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
Somewhat concerned	37	56.06%
Extremely concerned	22	33.33%
Not concerned	7	10.61%

Report from www.SurveyGizmo.com

4. Please select the one hazard you think is the highest threat to your neighborhood:



STATISTICS

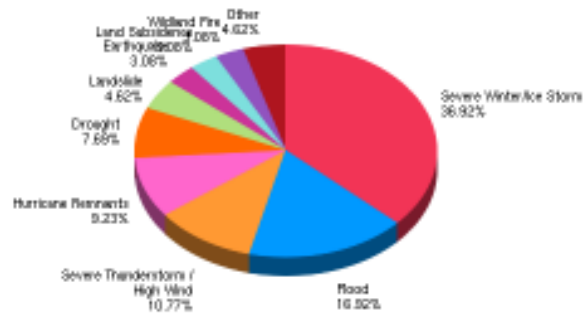
Choices Selected: 65
Total Responses: 65

SUMMARY

VALUE	COUNT	PERCENT %
Severe Thunderstorm / High Wind	21	32.31%
Flood	17	26.15%
Wildfire	10	15.38%
Tornado	5	7.69%
Hurricane Remnants	3	4.62%
Acts of Terror	2	3.08%
Drought	2	3.08%
Landslide	2	3.08%
Earthquake	1	1.54%
Expansive Soils	1	1.54%
Hailstorm	1	1.54%

Report from www.SurveyGizmo.com

5. Please select the one hazard you think is the second highest threat to your neighborhood:



STATISTICS

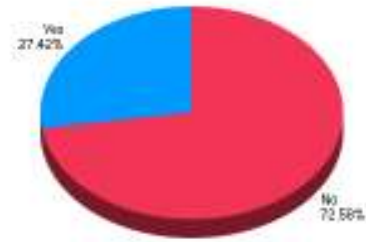
Choices Selected: 65
Total Responses: 65

SUMMARY

VALUE	COUNT	PERCENT %
Severe Winter/Ice Storm	24	36.92%
Flood	11	16.92%
Severe Thunderstorm / High Wind	7	10.77%
Hurricane Remnants	6	9.23%
Drought	5	7.69%
Landslide	3	4.62%
Earthquake	2	3.08%
Land Subsidence	2	3.08%
Wildland Fire	2	3.08%
Acts of Terror	1	1.54%
Lightning	1	1.54%
Tornado	1	1.54%

Report from www.SurveyGizmo.com

6. Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

**STATISTICS**

Choices Selected: 62
Total Responses: 62

SUMMARY

VALUE	COUNT	PERCENT %
No	45	72.58%
Yes	17	27.42%

Report from www.SurveyGizmo.com

7. Is your home located in a floodplain?**STATISTICS**

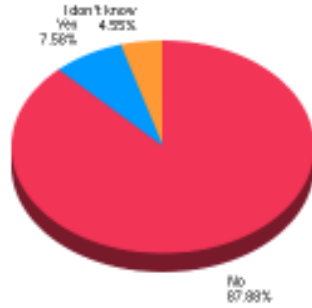
Choices Selected: 66

Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
No	56	84.85%
I don't know	9	13.64%
Yes	1	1.52%

Report from www.SurveyGizmo.com

8. Do you have flood insurance?**STATISTICS**

Choices Selected: 66

Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
No	58	87.88%
Yes	5	7.58%
I don't know	3	4.55%

Report from www.SurveyGizmo.com

9. a. If "No," why not?



STATISTICS

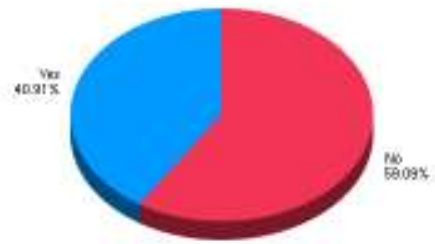
Choices Selected: 56

Total Responses: 56

SUMMARY

VALUE	COUNT	PERCENT %
Not located in floodplain	29	51.79%
Not necessary because I'm elevated or otherwise protected	13	23.21%
Too expensive	4	7.14%
Never really considered it	3	5.36%
Not necessary because it never floods	2	3.57%
want too move	1	1.79%
if it floods at my house, Noah will have to pick you up in Raleigh	1	1.79%
Mostly due to elevation, but I do have renter's insurance.	1	1.79%
Negligible chance of home affected by gravity processes or flood.	1	1.79%
not sure...don't think much of insurance..not sure it would have covered our problems	1	1.79%

Report from www.SurveyGizmo.com

10. Have you taken any actions to make your home or neighborhood more resistant to hazards?**STATISTICS**

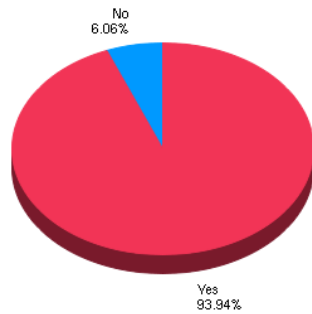
Choices Selected: 66

Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
No	39	59.09%
Yes	27	40.91%

Report from www.SurveyGizmo.com

11. Are you interested in making your home or neighborhood more resistant to hazards?**STATISTICS**

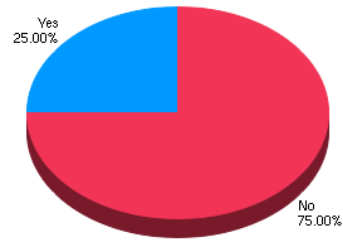
Choices Selected: 66

Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
Yes	62	93.94%
No	4	6.06%

Report from www.SurveyGizmo.com

12. Do you know what office to contact regarding reducing your risks to hazards in your area?**STATISTICS**

Choices Selected: 64

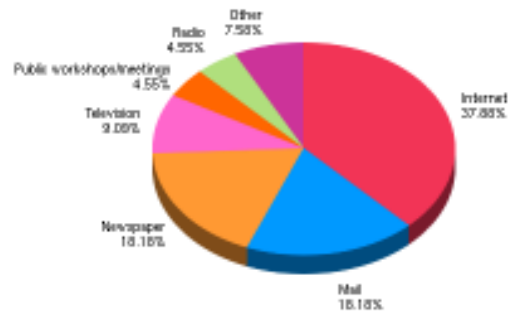
Total Responses: 64

SUMMARY

VALUE	COUNT	PERCENT %
No	48	75.00%
Yes	16	25.00%

Report from www.SurveyGizmo.com

13. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?



STATISTICS

Choices Selected: 66
Total Responses: 66

SUMMARY

VALUE	COUNT	PERCENT %
Internet	25	37.88%
Mail	12	18.18%
Newspaper	12	18.18%
Television	6	9.09%
Public workshops/meetings	3	4.55%
Radio	3	4.55%
common sense!	1	1.52%
e-mail	1	1.52%
email	1	1.52%
move	1	1.52%
Television, if electrical & cable services are available.	1	1.52%

Report from www.SurveyGizmo.com

14. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing. ()

ITEM	Very Important	Somewhat Important	Not Important	Total
PREVENTION (Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include: planning and zoning, building codes, open space preservation, and floodplain regulations.)	80.0% 52	16.9% 11	3.1% 2	65
PROPERTY PROTECTION (Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include: acquisition, relocation, elevation, structural retrofits, and storm shutters.)	36.9% 24	53.8% 35	9.2% 6	65
NATURAL RESOURCE PROTECTION (Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.)	68.8% 44	31.3% 20	-	64
STRUCTURAL PROJECTS (Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include: dams, levees, detention/retention basins, channel modification, retaining walls, and storm sewers.)	43.8% 28	40.6% 26	15.6% 10	64
EMERGENCY SERVICES (Actions that protect people and property during and immediately after a hazard event. Examples include: warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.)	78.1% 50	18.8% 12	3.1% 2	64
PUBLIC EDUCATION AND AWARENESS (Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include: outreach projects, school education programs, library materials and demonstration events.)	75.0% 48	20.3% 13	4.7% 3	64
Average %:	63.7%	30.3%	6.0%	386

Total Responses: 65

Appendix 2:
a. If “Yes,” please explain:

DATA

CODE	VALUE
59154363	Lost power in major storms.
59158773	Hurricanes while living in the Bahamas
59179723	Despite precautions, my water pipes froze and burst last night due to prolonged extreme cold temperatures. There is damage to the plumbing and duct work under my house.
59258745	Floods of '77 and '94.
59311089	Flood of 77
59341682	Flooding in the early '90's and 00's washed out only access road to town from upper bolens creek
59381050	Bridge washed away during hurricanes several years ago. No water during most of this winter. Power outage during the snow storm before Christmas. Trees in the road.
59409048	flooding ,power outage
59440743	the flood of 1977
59460920	Flood "1977"
59479611	chemical explosion at unimin plant in ledger in 2009
59557051	1977 flood, 1993 Blizzard
59568982	Flooding in September 2004.
59603738	2004 Ivan and Francis Hurricanes Flooding 1993 Blizzard Almost impossible to get out, power outage
59753273	1993 Blizzard, 1976 Flood, Floods of 2004 & 2005
59917503	Power outage and deep snow,and earthquake.
59938444	flooding washed away yard and road and driveway
59958560	Flooding / downed debris / mud slides
59962408	Blizzard of 1993
60063977	flood of 1977 took out the bridge connecting our road to the main road

60100237	Hurricanes and flooding Blizzard
60184835	1972- Elmira NY, Agnus Flood. I was a Police Officer at the time; worked 12 hour shifts for a month syeady until conditions relaxed. In 2002 &3 while heading the Crime Prevention Unit of the Seminole County Sheriff's Office in Sanford FL, helped set up and direct the Critical Assessment Teams for survying critical sites in the county that may be potential targets of terroists.
60232048	Multiple hurricanes over a 3 week period a few years ago.
60344695	Flooding of Bolens Creek in Yancey County
60367201	katrina, ivan, hugo
60529050	Hurricane Donna (in SE Va) 1960 Blizzard of 1993 (Asheville) Floods in 2004 (WNC)
61000181	Damage from fallen trees
62880393	we lost our bulkhead, our basement and everything in it, our gas tank...our central heating equipment...during hurricane...wespent over \$10,000 to put it all back...
64171657	living in the same area of yancey co. since 1972 we've seen at least 2 damaging floods,although we live on a hill we had damage to roads culverts and property. next would be severe winters with ice & heavy snowfall.
65528730	the roads where i live are in horrible condition. maintance is volunteer and run by undezirable people. we are un able to get deleviries, soon we wont be able to receive mail. my taxes increases 100%. 85000. for one acre. when we lost power. fire dept gave water only too certian people. in this community we have no police dept.code dept,dss dept. chemical dept anyone can grow xmas trees. no rules on water, creeks being rerouted.or dymite.
65637613	Flood
66728934	1977 flood, numerous blizzards, 2005 floods
69035034	Floods of 1977 and 1998
71825182	lived in small community in OK when hit with several tornadoes. Damage was extensive with loss of life
71921416	Due to heavy snows in Juneau, Alaska, a few winters ago, there was an avalanche causing the hydroelectric power plant's towers to fall before delivering power to Juneau, so the city had to use diesel instead. Due to this we were encouraged to unplug anything not actually needed to save electricity, as well as make other changes to help reduce consumption. We also had to be ready for airlines and ports to be closed during and after 9/11/2001. We were encouraged to make safety plans based on our individual geographic areas & family needs. Since our work and schools were on the mainland, but my daughter & I lived on Douglas Island, we had to also plan for the possibilities of being separated in an emergency.
75386761	Hurricane rain flooded house on Winter Star Rd/Cattail Creek.
78209063	Hurricane Andrew, 1992, Miami dade Co., Fla. Slope failure, 2009, Yancey co. NC

80183375 The Big Flood 1978 or 79 ?

Appendix 3:
a. If "Yes," please explain:

DATA

CODE	VALUE
58798836	Wildland Fire
59333003	weekend bridges collapsing, rockslides, trees falling into roadways and hurting or killing someone.
59341682	severe lack of planning by local government. ineptitude of local emergency managment team leaves the populace vulnerable to whatever may happen.
59479611	an emergency at one of the many local plants
59557051	Wildland Fire.
59821805	Land slides and damage due to large debris (such as trees within the forest breaking)
59863216	ice storm
59938444	drought..has been a problem in the past
59958560	High wind, ice storm, hailstorm
60100237	we only have one access road to our home
60126654	acts of terror
60367201	hazardous materials transported by road and rail carriers water resources are at risk from upstream industrial and agricultural uses. there is very little monitoring and less enforcement of codes that are already too lenient on polluters
62880393	disease to hemlocks
64171657	severe thunderstorm & high wind also power outages due to severe weather.
65528730	we have no police dept.i feel like i dont live in america. 99% of people are on medicade
71921416	Many of my daughter's classmates, even in high school, are very unfamiliar with surrounding areas and available resources.
80183375	wildfire

Appendix 4:
a. If "Yes," please explain:

DATA

CODE	VALUE
58798836	Clear trees and debris from around our home.
59154363	Rainwater collection. Solar energy.
59179723	I use no toxic chemicals to maintain my lawn and garden, to eliminate poisonous runoff during downpours. I encourage shade trees to cool rather than rely on air conditioning, which exacerbates extreme weather conditions.
59333003	try to keep trees away from home and dead or hazardous looking trees away from roadside on private road.
59341682	trees and vegetation kept cut away from house
59409048	keeping an area around house clear of wild fire fuel
59440743	earthquake insurance
59568982	I have added drainage systems to my property to mitigate water collection from heavy rains.
59821805	Cut and remove dead limbs as well as large limbs which have grown over residences.
59917503	I bought a generater for power. I keep a supply of food and water.
60232048	Cleared brush away from my home. Keep ditches clear for run off.
60295775	Limited trees immediately around the house. Ditching & drainage lines to creek to eliminate some of the water run off on the elevated land behind our house.
58799980	we have had the trees killed or damaged by the bettle infestation cut down and are in the process of clearing out dead trees and under brush
60529050	Improved groundwater and storm drainage around home. Removed trees adjacent to home. Have secondary source of heat for home (wood stove).
60608345	backup electric
60740624	Trees cut, water diverted
62880393	built new and better bulkhead, lots of trees were planted, lots of rock
64171657	as to flooding, have made improvments like larger culverts & drainage ditches.
65528730	the police wont respond when you call, why bother.

66728934	Cleared ample trees, installed oversized culvert in drive
71921416	We have tried to prepare most of the things listed on www.ready.gov 's website and have encouraged family, friends, and co-workers to do the same.
75386761	Regraded and trenched lot to modify water runoff away from residence.
78209063	Planted trees, shrubs and root growth plants to hold soil.
80183375	made the porch lower then the door , for Snow clearence.

Appendix 5:

In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

DATA

CODE	VALUE
58798836	Better education
59158773	keep trees away from live wires and teach us about measures to keep tree hazards away from homes
59162455	Enact zoning and strict steep slope regulations. Curb the amount of development in the area to protect not only the views shed but the water quality, slope stability, etc.
59179723	Protect the creeks and rivers from development and unsustainable farming practices such as chemical fertilizers. Build incentives to protect mature trees with pruning instead of topping, which keep trees healthy and will afford more shade in drought conditions.
59258745	Education and prevention.
59265724	Assess drought threat indicators (i.e. private well levels) and provide tax payers assistance (tax rebate to improve water conditions) during drought times.
59296238	Keep the creeks cleaned out, new storm drains.
59333003	check roadways for damage caused by large construction vehicles and check for dead or weak trees near roadsides to prevent them from falling into roadways.
59341682	hire educated, inquisitive staff that give a damn about anything but the paycheck or vacation
59381050	Provide emergency shelter and food in case of extreme cold like we have this week. When the power goes off there is no where in Yancey County for people to go to stay warm. We also need to keep the road, driveway and parking lot at the women's shelter cleared in case someone needs to come in there or if it needs to be used as an emergency shelter.
59440743	better communication to the community
59479611	have widely publicized emergency protocol to communicate to all, including more isolated families
59557051	Work with cable, phone, and electric co. to remove tree's that is hanging on or above lines.
59568982	Enact steep slopes protection to prevent road and home construction on unstable slopes.
59603738	Make it mandatory electrical companies to keep power line right of ways and line areas trimmed. Also, make loggers do selective cuts instead of clear cuts. This would keep older trees cleaned out but continue to help stop erosion.
59760793	Education

59821805	There really is no way for the local government to reduce hazard damages unless they are terrorist-related, and the local government could only reduce or eliminate the risk or future hazard damage if they are privileged with the information before terrorists acts are acted upon.
59917503	Clearing the roads from snow and ice faster. Local radio needs to report on hazards.
59958560	planning for these emergency ...that's why we pay the emergency coord.
60126654	set up emergency shelters if a disaster was to happen especially for people who live in apt.
60184835	Maintanance of secondary roadways to assist if a hazrd arises. Set aside funds and or supplies to insure protection until, if necessary, other outside help is required.
60232048	Make sure the creeks and other watershed areas are free of debris.
60295775	Restrict over grading of mountain sides. Have environmental and restrictions on some of the building in this area. State should keep creeks & rivers cleaned out (where they have right of way).
58799980	Insure that the logging outfits and power copanies clear up anything that is cut down and not used when they are cutting down trees . It not only looks horrible , but it is perfect fuel for a fire that can spread throughout the county.
60529050	Restrict floodplain development to appropriate uses (farming, recreation, no permanent homes/buildings. Enact/enforce building codes on appropriate slopes/conditions (not steep slopes).
60608345	none
61000181	I would be interested in knowing what prior damages have occurred in Yancey and surrounding counties
61030848	Don't know
62880393	keep the river free of debris..ny neighbors cleared their lot and put all in the river..i tried to find someone to report this to and could not find anyone..i called everyone i could think of.
64171657	to make sure power companies keep right of ways cut to stop trees & limbs from breaking power lines.
65528730	envestigate every agency in county, i reported creek damage twice, no one called,came. installed a trailor 10 feet from creekmust be open pit method.fire all inspectors
66728934	Not much as the hazard damages are a result of natural disasters
67232634	Better planning, more land use regulations
69035034	Educate themselves and us. Tell us what they are doing to prepare themselves and us. Communication is the key.

69722981	not sure what the local gov. could do. After the last hurricane remnants the Little rock creek flooded and eroded the banks and roads. FEMA came in and re-engineered the creek banks. They did a great job!
71825182	more widespread trainings for not just local city resources but the area is rich with state, city and federal employees and agencies ready and willing to train. Have a "disaster day" for various workshops, safety booths, etc do it on the town square and incorporate a run or event to coincide with it.
71921416	Advertise within all of the media areas and talking to the kids in schools to encourage them to talk to their families & friends to look for better solutions.
72990647	It's not there responsibility
74790195	Instalation of guard rails on parts of Hwy 197 south and parts of Bowlens Creek rd
75386761	Tougher development standards.
78209063	Slope laws and restrictions. Require builders/developers to remove tree and other debris from job site and require compaction of loose soil.
80183375	They need to let people know about ,where to recieve warnings, what is the signal for tornado warning . Where are the shealters in case ppl have to leave there homes. set up a person or group for each area . to give updates on any sitituation have these to contact Emergency Mangement that way they know what is going on in the county and where , what ,when , how

Appendix 6:

Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

DATA

CODE	VALUE
58798836	none
74790195	none
59162455	The amount people who burn without the proper permit is a bit disconcerting. There seems to be a lack of consideration from authorities when this happens.
59179723	Well, I think we have to stop scaring people so much about what is natural, and what our ancestors simply dealt with instead of running to stock up on things. This reliance on technology is going to let us down, just like our reliance on an unsustainable food production keeps us broke and unhealthy. We need to re-learn what it means to provide our own food, shelter, and clothing, and not expect the government to bail us out of the results of our own bad choices and lackadaisical lifestyles.
59258745	Stop building houses on steep slopes, especially if the owner has removed trees to get a better view.
59333003	Just keeping a close eye on hazardous conditions before they happen. There are bridges on side roads being damaged due to the construction of HWY 19. The bridges of 19W and Whittington Rd. are being broken up and are causing road hazards. Hopefully the bridge at Whittington won't falter as it is the only way in or out of that area. A lot of people would be affected by this if it was to happen.
59341682	no
60608345	no
59479611	yes, a list of people that might need assistance in an emergency and a plan to contact/assist those people (widows, developmentally delayed, physically isolated, financially challenged)
59557051	Get Cell Service in busick and other remote area's that is heavy populated. One tree on a phone line can stop all communication to that area.
59917503	Letting people know where to go or call if their is a disaster, and they need help.
60126654	don ,t know
60184835	Doing exactly what you are doing... create a workable and economical plan.
60232048	Utilities should be underground to reduce damage in storms.
61030848	Don't know
65528730	i wont drink water, worried about xmas trees, neighbor sold allium side of old trailor,now we have insulation only. beans creek road, mitchell county

69035034	Chemicals on the railroad. What if there is a spill on the road or the railroad?
71825182	It doesnt appear to me that the local law enforcement, rescue, etc are ready or geared for a disaster. There is a serious lack of communication with anything other than state agencies. Remember the 911 commission that discussed better communication? I dont see it and dont hear it
71921416	Encourage families that the emergency preparedness kits for their families are more important than new video games and new toys, when shopping for kids and money is an issue. Teaching the kids that by parents taking the time to teach them some self-sufficiency and working as a community, is more valuable to everyone. Also, our elderly folks needs things like batteries for radios, flashlights, and hearing aids more than another knicknack for the shelf.
78209063	Government needs to be more aware of slope failure problems and declare a disaster area to help homeowners recover.
80183375	make a list of disabled or ambulatory or people needing Oxygen . so that they know if a disaster affects that area to get the appropriate help fast.



Local Capability Assessment for Hazard Mitigation

The intent of this survey questionnaire is to initiate an assessment of the existing capabilities to implement hazard mitigation activities for the participating jurisdictions in the Toe River Regional Hazard Mitigation Plan. The information provided in response to this survey will help provide us with a broad overview of how local programs are currently being used to lessen the impacts of potential hazards. In order to accurately assess your jurisdiction's capability, it is critical that representatives who are familiar with existing local government programs help complete this survey.

A capability assessment has two components: (1) an inventory of a jurisdiction's existing planning and regulatory tools and (2) an analysis of its capacity to carry them out. The assessment process will help identify existing gaps, conflicts or weaknesses that may need to be addressed through future mitigation planning goals, objectives and actions. It will also highlight the positive measures in place or already being performed that should continue to be supported and enhanced through future mitigation efforts.

Most importantly, the capability assessment will help to ensure that proposed mitigation actions are deemed practical considering the local ability to implement them. In so doing, the results of the capability assessment will help build the general foundation for determining the type of mitigation strategy your jurisdiction develops and ultimately adopts as part of the Toe River Regional Hazard Mitigation Plan.

Responses to this questionnaire can be provided using the attached hard copy or an electronic version. Once completed, surveys should be submitted to Nathan Slaughter at PBS&J. Hard copies can be mailed to the address below or faxed to (919) 876-6848. Electronic versions should be sent by e-mail to nslaughter@pbsj.com.

Attention: Nathan Slaughter, Project Manager
PBS&J

1616 E. Millbrook Rd., Suite 310
Raleigh, NC 27609

Phone: (919) 876-6888

Fax: (919) 876-6848

Email: nslaughter@pbsj.com

Local Capability Assessment Survey

Jurisdiction/Agency: _____ Phone: _____
 Point of Contact: _____ E-mail: _____

1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box. Then, for each particular item in place, identify the department or agency responsible for its implementation and indicate its estimated or anticipated effect on hazard loss reduction (Strongly Supports, Helps Facilitate or Hinders) with another "X". Finally, please provide additional comments or explanations in the space provided or with attachments.

Planning / Regulatory Tool	In Place	Under Development	Department / Agency Responsible	Effect on Loss Reduction			Comments
				Strongly Supports	Helps Facilitate	Hinders	
Hazard Mitigation Plan							
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)							
Floodplain Management Plan							
Open Space Management Plan (or Parks & Rec./ Greenways Plan)							
Stormwater Management Plan / Ordinance							
Natural Resource Protection Plan							
Flood Response Plan							
Emergency Operations Plan							
Continuity of Operations Plan							
Evacuation Plan							
Other Plans (please explain under Comments)							

Local Capability Assessment Survey

Planning / Regulatory Tool	In Place	Under Development	Department / Agency Responsible	Effect on Loss Reduction			Comments
				Strongly Supports	Facilitates	Hinders	
Disaster Recovery Plan							
Capital Improvements Plan							
Economic Development Plan							
Historic Preservation Plan							
Floodplain Ordinance (or Flood Damage Prevention Ordinance)							
Zoning Ordinance							
Subdivision Ordinance							
Unified Development Ordinance							
Post-disaster Redevelopment / Reconstruction Ordinance							
Building Code							
Fire Code							
National Flood Insurance Program (NFIP)							
NFIP Community Rating System (CRS Program)							

Local Capability Assessment Survey

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box . Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff / Personnel Resources	Yes	No	Department / Agency	Comments
Planners with knowledge of land development and land management practices				
Engineers or professionals trained in construction practices related to buildings and/or infrastructure				
Planners or engineers with an understanding of natural and/or human-caused hazards				
Emergency manager				
Floodplain manager				
Land surveyors				
Scientist familiar with the hazards of the community				
Staff with education or expertise to assess the community's vulnerability to hazards				
Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program				
Resource development staff or grant writers				

Local Capability Assessment Survey

3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for State of Federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any other comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department / Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)				
Special Purpose Taxes (or taxing districts)				
Gas / Electric Utility Fees				
Water / Sewer Fees				
Stormwater Utility Fees				
Development Impact Fees				
General Obligation, Revenue and/or Special Tax Bonds				
Partnering arrangements or intergovernmental agreements				
Other: _____				

Local Capability Assessment Survey

4. POLITICAL CAPABILITY - Political capability can be generally measured by the degree to which local political leadership is willing to enact policies and programs that reduce hazard vulnerabilities in your community, even if met with some opposition. Examples may include guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum State or Federal requirements (e.g., building codes, floodplain management, etc.). Please identify some general examples of these efforts if available and/or reference where more documentation can be found.

Local Capability Assessment Survey

5. SELF-ASSESSMENT OF CAPABILITY - Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate or High) based upon best available information and the responses provided in Sections 1-4 of this survey.

	DEGREE OF CAPABILITY		
	LIMITED	MODERATE	HIGH
Planning and Regulatory Capability			
Administrative and Technical Capability			
Fiscal Capability			
Political Capability			
OVERALL CAPABILITY			

Points System for Capability Ranking

0-24 points = Limited overall capability
25-49 points = Moderate overall capability
50-80 points = High overall capability

I. Planning and Regulatory Capability (Up to 43 points)

Yes = 3 points

Under Development = 1 point

No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- Participate in NFIP
- Participate in CRS Program

Yes = 2 points

Under Development = 1 point

No = 0 points

- Open Space Management / Parks & Rec. Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-Disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point

No = 0 points

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

II. Administrative and Technical Capability (Up to 15 points)

Yes = 2 points

No = 0 points

- Planners with knowledge of land development and land management practices
- Engineers or professionals trained in construction practices related to buildings and/or infrastructure
- Planners or engineers with an understanding of natural and/or human-caused hazards
- Emergency manager
- Floodplain manager

Yes = 1 point

No = 0 points

- Land surveyors
- Scientist familiar with the hazards of the community
- Staff with education or expertise to assess the community's vulnerability to hazards
- Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS
- Resource development staff or grant writers

III. Fiscal Capability (Up to 10 points)

Yes = 1 point

No = 0 points

- Capital Improvement Programming
- Community Development Block Grants
- Special Purpose Taxes
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation/ Revenue/ Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

IV. Self-Assessment of Overall Capability (Up to 10 points)

High = 2 points

Moderate = 1 points

Low = 0 points

- Technical Capability
- Fiscal Capability
- Administrative Capability
- Political Capability
- Overall Capability

Appendix C: Local Mitigation Plan Crosswalk

This section of the Plan includes a completed Local Mitigation Plan Crosswalk.

INSTRUCTIONS FOR USING THE PLAN REVIEW CROSSWALK FOR REVIEW OF LOCAL MITIGATION PLANS

Attached is a Plan Review Crosswalk based on the **Local Multi-Hazard Mitigation Planning Guidance**, published by FEMA in July, 2008. This Plan Review Crosswalk is consistent with the **Robert T. Stafford Disaster Relief and Emergency Assistance Act** (Stafford Act), as amended by Section 322 of the **Disaster Mitigation Act of 2000** (P.L. 106-390), the **National Flood Insurance Act of 1968**, as amended by the **National Flood Insurance Reform Act of 2004** (P.L. 108-264) and 44 Code of Federal Regulations (CFR) Part 201 – *Mitigation Planning*, inclusive of all amendments through October 31, 2007.

SCORING SYSTEM

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a summary score of "Satisfactory." A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

When reviewing single jurisdiction plans, reviewers may want to put an N/A in the boxes for multi-jurisdictional plan requirements. When reviewing multi-jurisdictional plans, however, all elements apply. States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements. Optional matrices for assisting in the review of sections on profiling hazards, assessing vulnerability, and identifying and analyzing mitigation actions are found at the end of the Plan Review Crosswalk.

The example below illustrates how to fill in the Plan Review Crosswalk.:

Assessing Vulnerability: Overview				
Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.				
Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?	Section II, pp. 4-10	The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by winter storms.		<input type="checkbox"/>
B. Does the new or updated plan address the impact of each hazard on the jurisdiction?	Section II, pp. 10-20	The plan does not address the impact of two of the five hazards addressed in the plan. Required Revisions: <ul style="list-style-type: none">• Include a description of the impact of floods and earthquakes on the assets. Recommended Revisions: This information can be presented in terms of dollar value or percentages of damage.	<input type="checkbox"/>	
SUMMARY SCORE			<input type="checkbox"/>	

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a "Needs Improvement" score.

Prerequisite(s) (Check Applicable Box)	NOT MET	MET
1. Adoption by the Local Governing Body: §201.6(c)(5) OR	N/A	N/A
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) AND		
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		X
		X
Planning Process	N	S
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		X
Risk Assessment	N	S
5. Identifying Hazards: §201.6(c)(2)(i)		X
6. Profiling Hazards: §201.6(c)(2)(i)		X
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		X
8. Assessing Vulnerability: Addressing Repetitive Loss Properties. §201.6(c)(2)(ii)		X
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)	X	
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	X	
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	X	
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		X

*States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	N	S
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		X
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		X
15. Identification and Analysis of Mitigation Actions: NFIP Compliance. §201.6(c)(3)(ii)		X
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		X
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		X
Plan Maintenance Process	N	S
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		X
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		X
20. Continued Public Involvement: §201.6(c)(4)(iii)		X
Additional State Requirements*	N	S
Insert State Requirement		
Insert State Requirement		
Insert State Requirement		

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED	
See Reviewer's Comments	
PLAN APPROVED	X

Local Mitigation Plan Review and Approval Status

Jurisdiction: Toe River Region (multi-jurisdiction)	Title of Plan: Toe River Regional Hazard Mitigation Plan	Date of Plan: May 2010
Local Point of Contact: Kathy Young	Address: 26 Crimson Laurel Circle, Suite 2 Bakersville, NC 28705	
Title: Clerk to the Board/HR Director		
Agency: Mitchell County		
Phone Number: 828-688-2139 x 312	E-Mail: kyoung@mitchell.main.nc.us	

State Reviewer: Chris Crew	Title:	Date:
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FEMA Reviewer: Edwardine S. Marrone Linda L. Byers(QC) Edwardine S. Marrone	Title: Hazard Mitigation Community Planner FEMA Lead Planning Specialist Hazard Mitigation Community Planner	Date: October 18, 2010 October 21, 2010 March 1, 2011
Date Received in FEMA Region IV	September 9, 2010	
Plan Not Approved	October 21, 2010	
Plan Approved	May 19, 2011	
Date Approved	May 19, 2011 (ADD Letter 5-24-11; all other participating jurisdictions adopted)	

Jurisdiction:	DFIRM		NFIP Status*			
	In Plan	NOT in Plan	Y	N	N/A	CRS Class
1. Avery County			X			
2. Banner Elk			X			
3. Crossnore			X			
4. Elk Park			X			
5. Grandfather Village			X			

* Notes:

Y = Participating

N = Not Participating

N/A = Not Mapped

Jurisdiction:	DFIRM		NFIP Status*		
	In Plan	NOT in Plan	Y	N	N/A
6. Sugar Mountain	X		X		
7. Newland	X		X		
8. McDowell County	X		X		
9. Marion	X		X		
10. Old Fort	X		X		
11. Mitchell County	X		X		
12. Bakersville	X		X		
13. Spruce Pine	X		X		
14. Yancey County	X		X		
15. Burnsville	X		X		

PREREQUISITE(S)

1. Adoption by the Local Governing Body

Requirement §201.6(c)(5): *[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Has the local governing body adopted new or updated plan?	Appendix A, Page A-1	The plan will be adopted once it has been reviewed by FEMA. <i>This is multi-jurisdictional plan.</i>	N/A	N/A
B. Is supporting documentation, such as a resolution, included?	Appendix A, Page A-1	Supporting documentation will be included once the plan is reviewed by FEMA and adopted by the local governing bodies. <i>This is multi-jurisdictional plan.</i>	N/A	N/A
SUMMARY SCORE			N/A	N/A

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan indicate the specific jurisdictions represented in the plan?	Section 1, page 1:3	<p>The participating counties and municipal jurisdictions are listed on page 1:3.</p> <p>The updated Plan states as one of the purposes is to "Merge the existing Avery, McDowell, Mitchell, and Yancey County hazard mitigation plans into one regional plan" Table 1.1 provides a break down of the participants down to the Town/City level of participation.</p> <p>The plan will be adopted after it has been reviewed by FEMA.</p> <p>The updated Plan has not been adopted by any of the local governing bodies.</p> <p>REQUIRED:</p> <ul style="list-style-type: none"> The Updated Plan must be adopted within one calendar year of FEMA's "approval pending adoption" of the Updated Plan. <p><i>For more information, see "Multi-Jurisdictional Plan Adoption", in the Local Multi-Hazard Mitigation Planning Guidance, Page 17-20.</i></p> <p>Response to comment: The plan will be adopted by each of the participating jurisdictions once FEMA has determined that the plan is "approvable pending adoption."</p>		X
B. For each jurisdiction, has the local governing body adopted the new or updated plan?	Appendix A, Page A-1	<p>5-19-11: Yancey County and the Town of Burnsville adopted the Plan.</p> <p>5-24-11: All other participating jurisdictions adopted the Plan.</p> <p>The plan will be adopted once it is reviewed by FEMA. Adoption resolutions will included in Appendix A.</p> <p>No supporting documentation is included in the updated Plan.</p> <p>REQUIRED REVISION:</p> <ul style="list-style-type: none"> The Updated Plan shall include a copy of the resolution or other documentation of formal adoption of the Updated Plan within one calendar year. <p><i>For more information, see "Multi-Jurisdictional Plan Adoption", in the Local Multi-Hazard Mitigation Planning Guidance, Pages 19 – 20.</i></p> <p>Response to comment: The plan will be adopted by each of the participating jurisdictions once FEMA has determined that the plan is "approvable pending adoption."</p> <p>5-19-11: Yancey Co and the Town of Burnsville provided Adoption Resolutions.</p> <p>5-24-11: All other participating jurisdictions provided Adoption Resolutions.</p>		X
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?	Appendix A, Page A-1			X
JULY 1, 2008 (W / D F I R M)				A - 7
SUMMARY SCORE				X

3. Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan describe how each jurisdiction participated in the plan's development?	Section 2, throughout, specifically in Section 2.4.1 on pages 2:5 and 2:6 Page 2:3	As a participating member of the plan, each jurisdiction was required to complete several task in order to demonstrate plan participation. Jurisdictions are adequately addressed. The updated Plan states: "... all of the jurisdictions that previously participated in previous planning efforts have participated in the development of this regional plan."		X
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?	Section 2, Page 2:2 – 2:3 Page 2:2	Yes, Each with a previous plan in place, joined together for the Toe River Regional Plan. This is the first regional hazard mitigation planning effort among the jurisdictions. However, since each jurisdiction had an approved plan, the plan references this throughout the document. The updated Plan states: "For this plan, all of the aforementioned jurisdictions have joined to form a regional plan, making it a unique situation. No new jurisdictions have joined the process"		X
SUMMARY SCORE				X

PLANNING PROCESS: §201.6(b): An open public involvement process is essential to the development of an effective plan.

4. Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of the process followed to prepare the new or updated plan?	Section 2, page 2:3 -2:11	The planning process is generally outlined, including a figure (Figure 2.1). Then, each meeting is described.		X

4. Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Location in the			SCORE
	Section 2.5 Section 2.3 to 2.5	<p>This section provides a detailed description of the meetings held for the completion of this plan.</p> <p>The updated Plan provides a narrative description of the process followed to prepare the updated plan. Including in the description are summaries of the meetings held, a 12-Step Planning Process, see figure 2.1.</p>	
B. Does the new or updated plan indicate who was involved in the current planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	<p>Section 2, throughout; Sections 2.3, 2.4, and 2.5</p> <p>Appendix D</p> <p>Pages 2:3 – 2:5; Table 2.1</p>	<p>This section explains that the Region hired PBS&J as a consultant. Table 2.1 on page 2:5 provides a list of the Toe River Regional Hazard Mitigation Planning Committee participants.</p> <p>Section 2.5 indicates who was involved in each meeting. Appendix D includes the meeting agendas and sign-in sheets.</p> <p>The updated Plan states: "To prepare the 2010 Toe River Regional Hazard Mitigation Plan (TRRHMP), the Toe River Region hired PBS&J as an outside consultant to provide professional mitigation planning services. To meet requirements of the Community Rating System, the region ensured that the planning process was facilitated under the direction of a professional planner. Nathan Slaughter from PBS&J served as the lead planner for this project" Additionally, "the Toe River counties (Avery County, McDowell County, Mitchell County, and Yancey County) created the Toe River Regional Hazard Mitigation Planning Committee (TRRHMP or TRRHMP Planning Committee). The TRRHMP represents a community-based planning team made up of representatives from various county departments and municipalities and other key stakeholders identified to serve as critical partners in the planning process." Table 2.1 provides the TRRHMP member list.</p>	X

4. Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Location in the			SCORE
C. Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	<p>Section 2.6, pages 2:12 – 2:14</p> <p>Page 2:5</p>	<p>This section indicates that public input was sought through open public meetings and public surveys.</p> <p>Page 2:13 indicate the number of citizens that attended the public meetings, what was discussed and how their comments were integrated into the plan.</p> <p>The updated Plan states: "Additional participation and input from other identified stakeholders and the general public was sought by the Toe River counties during the planning process through phone calls and the distribution of e-mails, advertisements and public notices aimed at informing people on the status of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed later in this section)."</p> <p>Section 2:16 provides greater detail regarding public involvement. This information cover the drafting stage a place holder for the final meeting prior to plan approval is on page 2:13. Until this meeting is actually held this requirement is scored not met.</p> <p><u>REQUIRED REVISION:</u></p> <p>Document that the public was provided an opportunity to comment on the Updated Plan prior to the approval.</p> <p>For more information, see "Documentation of the Planning Process", in the Local Multi-Hazard Mitigation Planning Guidance, Pages 26 – 28.</p> <p>Response to comment: The final public meetings will be held in each jurisdiction before the plan is officially adopted. These meetings will not take place until FEMA has determined that the plan is "approvable pending adoption." 5-19-11: Final meeting held when Adoption Resolution signed.</p>	X
D. Does the new or updated plan discuss the opportunity for neighboring communities, agencies,	Section 2.7, page 2:14	Meeting advertisements invited stakeholders and a survey was distributed to solicit input from local officials, residents,	

4. Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Location in the			SCORE
businesses, academia, nonprofits, and other interested parties to be involved in the planning process?		businesses, academia and other private interests	
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Section 7, pages 7:3 and 7:4	<p>Page 2:14 indicate how other stakeholders were involved.</p> <p>FEMA Reviewer concurs with State Reviewer's comments.</p> <p>The Capability Assessment discusses the incorporation of various plans, studies, reports and technical information.</p> <p>FEMA Reviewer concurs with State Reviewer's comments. Additionally, the documents are listed in Table 7.1, pages 7:3 – 7:3.</p>	X
F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?	Section 2, page 2:2-2:3	<p>This is a new plan document. The jurisdictions, each with a previous plan in place, joined together for the Toe River Regional Plan. This is the first regional hazard mitigation planning effort among the jurisdictions. However, since each jurisdiction had an approved plan, the regional plan required some plan update revisions.</p> <p>The updated Plan states: "Although each participating jurisdiction had already developed a plan in the past, the combination of the four plans into one regional plan still required making some plan update revisions based on FEMA's Local Multi-Hazard Mitigation Planning Guidance. Since all sections of the regional plan are technically new, plan update requirements do not apply. However, since this is the first regional plan among the jurisdictions, key elements from the previous approved plans are referenced throughout the document (e.g., existing actions) and required a discussion of changes made. For example, all of the risk assessment elements needed to be updated to include most recent information. It was also necessary to formulate a single set of goals for the region, but they were based on previously determined goals (Section 8: <i>Mitigation Strategy</i>). The Capability Assessment section includes updated information for all of the participating jurisdictions and the Mitigation Action Plan provides implementation status updates for all of the actions identified in the previous plans."</p>	X
SUMMARY SCORE			X

RISK ASSESSMENT: §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	Section 4, page 4:3 – 4:17 Pages 1:3, 4:17	<p>Table 4.1 provides a description of all natural hazards. Table 4.2 documents these hazards and why they were or were not included.</p> <p>The updated Plan state: "The focus of the Toe River Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the Toe River Region, as determined through a detailed hazard risk assessment. Other hazards that pose a "low" or "negligible" risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk."</p> <p>Table 4.3 lists the hazards that will be addressed, which are:</p> <ul style="list-style-type: none"> • Drought, • Hailstorm, • Hurricane and Tropical Storm, • Lightning, • Tornado, • Severe Thunderstorm, • Winter Storm or Freeze, • Dam and Levee Failure • Erosion*, • Flood, • Earthquake, • Landslide, • Wildfire. <p>The list also includes Hazardous Materials Incident and Terror Threat however, these are not considered to be natural hazards, these 2 hazards will not be reviewed by FEMA.</p> <p>*Although Erosion was identified as a hazard the updated Plan states (Page 5:56) "...given the lack of historical events and threat to life or property, not further analysis will be done in Section 6: <i>Vulnerability Assessment</i>."</p>		X
SUMMARY SCORE				X

6. Profiling Hazards

Requirement §201.6(c)(2)(i): [The risk assessment **shall** include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?	Section 5, pages 5:6 – 5:68; page 5:74	<p>Each hazard has a sub-headed titled, "Location and Spatial Extent" that defines the area that the hazard affects.</p> <p>Table 5.38 on page 5:78 indicates the spatial extent of each hazard.</p> <p>The location of each natural hazard is addressed in the updated Plan. Table 5.2 on page 5:4 summarizes that all participating jurisdictions can be affected by the identified natural hazards.</p>		X
B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?	Section 5: Drought, Figure 5.2, page 5:6, Hail, Table 5.7, page 5:9, Figure 5.3, page 5.12; Hurricane/ Tropical Storm, Table 5.8, page 5:13, Table 5.10, page 5:15, Figure 5.5, page 5:18, Thunderstorms, Table 5.15, page 5:23, Tornado Table 5.16, page 5:28, Table 5.17, page 5:28, Earthquake Figure 5.8, page 5:38, Figure 5.11, page 5:46, Figure 5.12, page 5:47, Flood, Figure 5.16, page 5:58	<p>Each hazard addresses magnitude as it relates to the specific hazard (narrative and figure where applicable).</p> <p>The updated Plan identifies the extent for the following hazards:</p> <ul style="list-style-type: none"> • Drought – Palmer drought severity Index; • Hurricane - Saffir-Simpson Scale; • Tornado – Fujita scale & enhanced Fujita Scale; • Earthquake – Richter Scale, Modified Mercalli Intensity Scale; • Dam and Levee Failure – North Carolina Dam Hazard Classifications; • Hailstorm – Hail range in diameter <p>The following hazards extent was not addressed:</p> <ul style="list-style-type: none"> • Winter Storm and Freeze; • Lightning; • Severe Thunderstorm; • Landslide; • Flood; • Wildfire <p>REQUIRED REVISION: The Plan must indicate the range of magnitude or severity that could be experienced for each identified hazard addressed in the Plan, which will also be included in the discussion of their mitigation actions. Express Extent in terms of scientific scales, such as Fujita and Keetch-Byram, or quantitative measurements such as flood depth or temperatures.</p>		

		<p>Refer to Local Multi-hazard Mitigation Planning Guidance, July 2008, Requirement 201.6(c)(2)(i), page 32-35.</p> <p>Response to comment: Table 5.37 on page 5:73 was added to include information on hazard extent for all of the identified natural hazards.</p> <ul style="list-style-type: none"> • Winter Storm and Freeze; -inches of snow • Lightning; - NOAA flash density map ...2-8 lightning flashes per square kilometer per year. • Severe Thunderstorm; • Landslide; • Flood; • Wildfire <p>REVISIONS REVIEW: Table 5.37 defines extent for the hazards with the exception of Flood. The chosen measurement for flood is velocity of the floodwaters however; there is no definition of the measurement. Requirement is still not met.</p> <p>3-01-11 Revision provided for flood extent page 5:47. Requirement is now met.</p>			
C. Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?	Section 5 pages 5:6 – 5:69	Each hazard includes a subsection on Historical Occurrences and lists the previous events with accompanying information on date, magnitude, and property damage, if applicable.			X
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?	Section 5 pages 5:6 – 5:69 Section 5, Page 5:73 – 5:74	<p>FEMA Reviewer concurs with State Reviewer's comments.</p> <p>Each hazard has a subsection on Probability of Future Occurrence.</p> <p>Tables 5.37 and 5.38 on pages 5:73 and 5:74 provide descriptions of these classifications and summary information about the probability of future events.</p> <p>FEMA Reviewer concurs with State Reviewer's comments.</p>			X
SUMMARY SCORE					X

7. Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S

A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?	Section 6, page 6:6 to 6:55	<p>The tables associated with each hazard summarize the asset vulnerability, potential dollar loss, and number of buildings vulnerable to each hazard.</p> <p>Although the Plan update provided number of buildings; what is missing is the type of structures.</p> <p>REQUIRED REVISION: An overview of the community's vulnerability is a summary of the hazard's impact on the community and its vulnerable structures. This summary shall include, by type of hazard, a general description of the types of structures affected by the hazards. Examples include, structures that house the elderly or disabled, and areas where low-income populations reside.</p> <p>The vulnerability overview in the updated plan shall describe any changes, clarifications, or refinements to the overview summary described in the previously approved plan. It shall continue to include, by type of hazard, a general description of the types of structures affected by the hazard.</p> <p><i>For more information, please refer to "Assessing Vulnerability: Overview" in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 36-38.</i></p> <p>Response to comment: A narrative discussion was added to the end of page 6:46 to address the types of structures that are vulnerable to the identified hazards and the table on page 6:9 was updated.</p> <p>REVISIONS REVIEW: The revision states: "all building types are considered at risk to the winter storm hazard and commercial, residential and government owned facilities" page 6:47. Table 6.2 on page 6:9 provides the various types of structures with exception to critical facilities which now can be found in Table 6.3.</p>	X
B. Does the new or updated plan address the impact of each hazard on the jurisdiction?	Section 5, pages 5:6 – 5:68 and Section 5, page 5:73 Section 6, page 6:6 to 6:55	<p>Section 5 demonstrates the impact of each hazard by reporting previous occurrences (including property damage). The PRI table on page 5:73 provides the anticipated impact for each hazard.</p> <p>Section 6 reports annualized losses based on and the amount of people and property that would be affected by the hazard</p>	X

		(where applicable).		
		The updated Plan includes tables providing the assessed value and population that would be impacted for each identified hazard.		
SUMMARY SCORE				X

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment] **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of <i>repetitive loss properties</i> located in the identified hazard areas?	Section 5.14.5, page, 5:62 – 5:63 Page, 5:62 – 5:63; Figure 5:17	Note: This requirement becomes effective for all local plans approved after October 1, 2008. The number and types of repetitive loss properties are included. The updated Plan states: "Currently (as of December 2009), there are 18 non-mitigated repetitive loss properties located in the Toe River Region, which accounted for 48 losses and more than \$777,500 in claims payments under the NFIP. The average claim amount for these properties is \$19,554. Most of these properties (13) are single family residential and the remaining five (5) are commercial or government-owned buildings. Without mitigation, these properties will likely continue to experience flood losses." This statement is followed by a table which breaks it out by Location (County/Local Community), which is followed by a map showing the repetitive loss properties.		X
SUMMARY SCORE				X

9. Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the	<i>Number of Buildings:</i> Section 6, Table	Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.	X	

identified hazard areas?	6.1, page 6:8 - total buildings; Flood example: Table 6.29 and 6.30, page 6:34 and 6:35 <i>Critical Facilities and Infrastructure:</i> Section, 6 Table 6.39, page 6:50 through 6:55	<p>Section Six includes number of buildings at –risk and their value. In addition, known critical facilities that are vulnerable to a hazard are included.</p> <p>The updated Plan provides the quantity of critical facility units for the participating jurisdictions however, industrial, commercial, or residential quantities are not provided. Table 6.1 “Improved Property in the Toe River Region” provides a total number of units for the participating jurisdictions; however, it is not broken down to types of structures. Table 6.2 does provide a list of the Toe River Region’s critical facilities although not all inclusive. Additionally, Table 6.39 shows a complete list of the critical facilities by name, as well as the hazards that affect each facility.</p> <p><u>RECOMMENDED REVISION:</u></p> <p>In a future revision, this information <i>should</i> be based on an inventory of existing buildings, infrastructure and critical facilities (structures) located within identified hazard area boundaries.</p> <p><i>For more information, please refer to “Assessing Vulnerability: Identifying Structures” in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 42- 44.</i></p> <p><u>REVISIONS REVIEW:</u> With the revision of Table 6.2 and 6.3 which includes the number and type of structures, this requirement is now met.</p>		
B. Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?		<p>Note: A “Needs Improvement” score on this requirement will not preclude the plan from passing.</p> <p><u>RECOMMENDED REVISION:</u></p> <p>In a future revision, this information <i>should</i> be based on an inventory of future buildings, infrastructure and critical facilities (structures) that will be located within identified hazard area boundaries.</p> <p><i>For more information, please refer to “Assessing Vulnerability: Identifying Structures” in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 42- 44.</i></p>	X	
SUMMARY SCORE			X	

10. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): *[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate ...*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan estimate potential dollar losses to vulnerable structures?	<p><i>Examples:</i> Table 6.1, page 6:8 (Total Exposure)</p> <p>Table 6.9, page 6:17 (hurricane wind analysis)</p>	<p>Where applicable, each hazard includes the annualized loss and value of vulnerable structures for each jurisdiction. These figures have been updated for the 2010 plan.</p> <p>This requirement applies to both current and future structures.</p> <p>RECOMMENDED REVISION:</p> <p>In a future revision, the information <i>should</i> include an estimate of losses for the identified vulnerable structures. A monetary estimate <i>should</i> be provided for each hazard, and <i>should</i> include, when resources permit, structure, contents, and function losses to present a full picture of the total loss for each asset.</p> <p><i>For more information, please refer to "Assessing Vulnerability: Estimating Potential Losses" in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 45- 46.</i></p>	X	
B. Does the new or updated plan describe the methodology used to prepare the estimate?	<p>Section 6.2; pages 6:2 through 6:7</p>	<p>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</p> <p>Requirement not addressed in document.</p> <p>RECOMMENDED REVISION:</p> <p>In a future revision, the methodology used to determine losses should also be provided in the plan.</p> <p><i>For more information, please refer to "Assessing Vulnerability: Estimating Potential Losses" in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 45- 46</i></p>	X	
SUMMARY SCORE			X	

11. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): [The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe land uses and development trends?	Land Use: Section 3.3.3, page 3:5	<p>General land uses are discussed on this page.</p> <p>The updated Plan provides some general information regarding land use in this section</p> <p>RECOMMENDED REVISION:</p> <p>In a future revision, the updated plan <i>should</i> include a general overview of land uses and types of development occurring within the community, highlighting any changes since the previously approved plan. The update <i>should</i> specifically include existing and future land uses in identified hazard areas.</p> <p>If the previously approved plan noted date deficiencies in analyzing development trends and identified actions in the mitigation strategy to address them at a later time, then the new information <i>should</i> be incorporated. However, if the data deficiencies have not been resolved, they <i>should</i> be addressed in the updated plan, accompanied by an explanation of why they remain and an updated schedule to resolve the issue.</p> <p>For more information, please refer to "Assessing Vulnerability: Analyzing Development Trends" in the Local Multi-Hazard Mitigation Planning Guidance, July 2008, Pages 47- 49.</p>	X	
SUMMARY SCORE			X	

12. Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?	Sections 5 and 6, example Table 5:31 on page 5:59 Table 6.27 on page 6:31	<p>Risk variations by jurisdiction are discussed throughout sections 5 and 6 within each hazard discussion.</p> <p>FEMA Reviewer concurs with State Reviewer's comments.</p>		X

SUMMARY SCORE	
	X

MITIGATION STRATEGY: §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

13. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?	Section 8.2, page 8:3 – 8:4	The mitigation goals are presented in Table 8.2. These goals were formulated reviewing the existing goals from the four previously approved plans as described in Table 8.1 and the accompanying text. The process of reviewing the goals from the four existing plans and how the new goals were determined and eventually voted on by the planning committee is described on page 8:3. FEMA Reviewer concurs with State Reviewer's comments.		X
SUMMARY SCORE				X

14. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?	Section 8, page 8:4 to 8:6 Section 9, page 9:3 - 9:51 Section 9	Mitigation Action Plans are included for each jurisdiction and address a comprehensive range of mitigation actions falling into the categories of Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These categories are described in Section 8. Section 9 lists the actions for each jurisdiction. The updated Plan includes a comprehensive list of		X

		mitigation actions for each hazard which were analyzed.	
B. Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?	Section 9, Property Protection Actions (example: McDowell County, Mitigation Action 2, page 9:12), page 9:3 - 9:51	The Action Plan calls for building new structures that are more disaster resistant. FEMA Reviewer concurs with State Reviewer's comments.	X
C. Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?	Section 9, page 9:3 - 9:51 (example: Avery County, Mitigation Action 5, page 9:5)	The Action Plan calls for retrofitting of current development and reviewing structures after a disaster to rebuild more hazard resistant structures. FEMA Reviewer concurs with State Reviewer's comments.	X
SUMMARY SCORE			X

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Section 5, Page 5:61 – Page 5:62 Table 7.2 on page 7:10 Page 5:62	Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008. Table 5.33 lists the Toe River jurisdictions and indicates which are participating, the number of flood losses, and the amount of claim payments for each. Table 7.2 provides information about each jurisdiction's participation in the NFIP (date the jurisdiction joined the NFIP, current effective map date, number of NFIP policies in force, amount of insurance in force, number of closed NFIP claims, total payments made to date.) FEMA Reviewer concurs with State Reviewer's comments. Additionally, Section 5.14.5 covers Repetitive Loss Properties and includes an unnumbered table identifying by participating County/Local Jurisdiction the number of properties, number of Losses, etc.		X
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance	Section 9	Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.		

with the NFIP?	Avery County, Action 7, page 9:5	Each jurisdiction has identified at least once action related to continued compliance with the NFIP. FEMA reviewer concurs with State Reviewer's comments.	X
	Banner Elk, Action 2, page 9:6		
	Crossnore, Action 3, page 9:7		
	Elk Park, Action 3, page 9:8		
	Grandfather Village, Action 4, page 9:9		
	Newland, Action 2, page 9:10		
	Sugar Mountain, Action 4, page 9:11		
	McDowell County, Action 3, page 9:12		
	Marion, Action 1, page 9:18		
	Old Fort, Action 1, page 9:19		
	Mitchell County, Action 5, page 9:21		
	Bakersville, Action 1, page 9:51		
	Spruce Pine, Action 1, page 9:52		
	Yancey County,		

	Action 10, page 56 Burnsville, Action 6, page 9:59		
SUMMARY SCORE			X

16. Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section **shall** include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization **shall** include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated mitigation strategy include how the actions are prioritized ? (For example, is there a discussion of the process and criteria used?)	Section 8, page 8:2; Section 9:, Action Plan , page 9:3 - 9:51	Describes how the actions were prioritized, each action Each action is assigned a relative Priority rating of Low, Moderate or High based on the prioritization criteria listed on page 8:2. The updated Plan lists the following prioritization criteria: Prioritization of the proposed mitigation actions was based on the following six (6) factors: <ul style="list-style-type: none"> ■ Effect on overall risk to life and property ■ Ease of implementation ■ Political and community support ■ A general economic cost/benefit review¹ ■ Funding availability ■ Continued compliance with the NFIP 		X
B. Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete	Section 9, Action Plan, page 9:3 - 9:51	The Action Plan identifies a responsible party and estimated timeline to ensure implementation and administration of each mitigation action.		X

¹ Only a general economic cost/benefit review was considered by the FMHMP through the process of selecting and prioritizing mitigation actions. Mitigation actions with "high" priority were determined to be the most cost effective and most compatible with the participating jurisdictions' unique needs. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

each action?		FEMA reviewer concurs with State Reviewer's comments.		
C. Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?	Section 8, page 8:2–	See footnote The updated Plan includes cost-benefit as part of the prioritization process and states “Mitigation actions with “high” priority were determined to be the most cost effective and most compatible with the participating jurisdictions.”		X
D. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (<i>i.e.</i> , deferred), does the updated plan describe why no changes occurred?	Section 9, page 9:3 - 9:51	Each action has an associated “Implementation Status” that indicates completed, ongoing, deleted, etc.	N/A	N/A
SUMMARY SCORE				
				X

17. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan?	Section 9, page 9:3 - 9:51	<p>Each jurisdiction has at least two action items.</p> <p>Table 5.2 shows that all identified jurisdictions are affected by all identified hazards; however, not all jurisdictions have an action to mitigate against all hazards.</p> <p><u>REQUIRED REVISION:</u> The multi-jurisdictional plan must link the proposed mitigation actions to the applicable jurisdictions. Any jurisdiction within the planning area requesting approval for the plan must be able to point to specific actions to be pursued. Each jurisdiction must have participated in identifying and analyzing a comprehensive range of mitigation actions for each profiled hazard, which can result in an achievable mitigation action plan.</p> <p><i>For more information, please refer to "Multi-jurisdictional Mitigation Actions" in the Local Multi-hazard Mitigation Planning Guidance, July 2008, Pages 65-66.</i></p> <p>Response to comment: A public awareness action has been added to each jurisdiction's action plan that ensures that each jurisdiction addresses all hazards.</p> <p><u>REVISIONS REVIEW:</u> Revisions accepted, requirement is now met.</p>		X
B. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?	Section 9, page 9:3 - 9:51	<p>Each action has an associated "Implementation Status" that indicates completed, ongoing, deleted, etc.</p> <p>Each action is presented succinctly in individual action tables which includes the following information:</p> <ul style="list-style-type: none"> • Action • Hazard(s) Addressed • Category • Priority • Lead Agency/Department Responsible 		X

		<ul style="list-style-type: none"> • Estimated Cost • Potential Funding sources • Implementation Schedule • Implementation Status 		
SUMMARY SCORE				X

PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): [The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe the method and schedule for monitoring the plan, including the responsible department?	Section 10, page 10:2 Section 10	The monitoring process is described on page 10:2 The updated Plan includes the schedule for monitoring the plan on an as needed basis as well as once annually in March the Planning Committee will meet,		X
B. Does the new or updated plan describe the method and schedule for evaluating the plan, including how, when and by whom (i.e. the responsible department)?	Section 10, pages 10:2 – 10:4 Section 10	The evaluation process is described on pages 10:2 through 10:4 The updated Plan states the purpose of the annual meetings is to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. Periodic evaluation of the Plan will ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan. The findings and recommendations of the TRRHMP shall be documented in the form of a report.		X
C. Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?	Section 10, page 10:2 – 10:4 Section 10	The monitoring process is described on pages 10:2 through 10:4 The updated Plan states that the Plan will be thoroughly reviewed by the TRRHMP every five years and includes purposes for the review.		X
SUMMARY SCORE				X

19. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): [The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	Section 10, pages 10:1 and 10:2	The plan discusses local planning mechanisms for incorporating the requirements of the mitigation plan. The updated Plan states the Plan will be integrated into local planning documents, such as comprehensive or capital improvement plans, floodplain management ordinances, County emergency operations plans and building codes.		X
B. Does the new or updated plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	Section 10, pages 10:1 and 10:2	The process for integration is described. The updated Plan states the integration need will be identified during the review, evaluation of the Plan,		X
C. Does the updated plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	Section 2, page 2:14 and Section 10, page 10:2	Section 2 describes how the participating jurisdictions have integrated the plan through implementing mitigation actions and improving community capabilities. Section 10, page 10:2 indicates how the participants have integrated the hazard mitigation plan into other planning mechanisms. FEMA review concurs with State Reviewer's comments, additionally within the action plan under the "Implementation Status" where applicable, information is provided where local government has integrated the mitigation strategy into a local planning mechanism.		X
SUMMARY SCORE				X

Continued Public Involvement

Requirement §201.6(c)(4)(iii): [The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S

A. Does the new or updated plan explain how continued public participation will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Section 10.3, page 10:4	Several methods will be used to continually involve the public such as advertising, keeping the plan in libraries, and holding public meetings when major amendments are made to the plan. FEMA reviewer concurs with State Reviewer's comments, additionally the public will be involved in the review and update of the Plan,		X
		SUMMARY SCORE		X

MATRIX A: PROFILING HAZARDS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the jurisdiction. **Completing the matrix is not required.**

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each applicable hazard. An “N” for any element of any identified hazard will result in a “Needs Improvement” score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.



Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i) Yes	A. Location		B. Extent		C. Previous Occurrences		D. Probability of Future Events	
		N	S	N	S	N	S	N	S
Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansive Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hailstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Subsidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunami	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Legend:

§201.6(c)(2)(i) Profiling Hazards

- A. Does the risk assessment identify the location (i.e., geographic area affected) of each hazard addressed in the **new or updated** plan?
- B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the **new or updated** plan?
- C. Does the plan provide information on previous occurrences of each natural hazard addressed in the **new or updated** plan?
- D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the plan?

MATRIX C: IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure consideration of a range of actions for each hazard. **Completing the matrix is not required.**

*Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each **applicable** hazard. An "N" for any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Comprehensive Range of Actions and Projects	
		N	S
Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansive Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hailstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Subsidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunami	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To check boxes, double click on the box and change the default value to "checked."

Legend:

§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions

A. Does the **new or updated** plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

Appendix D: Planning Process Documentation

This section of the Plan includes three (3) items:

1. *TRRHMPD Meeting Agendas*
2. *TRRHMPD Sign-in Sheets*
3. *Public Meeting Documentation*

AGENDA

Toe River Regional Hazard Mitigation Plan Project Kickoff Meeting

October 29, 2009

10:00 AM – Noon

1) Introductions

2) Project Overview

- a) Key Objectives
- b) Project Tasks
- c) Project Schedule
- d) Project Staffing

3) Roles & Responsibilities

- a) PBS&J
- b) County Leads
- c) Participating Jurisdictions

4) Next Steps

- a) Determine members to participate on the Hazard Mitigation Planning Team
- b) Initiate data collection efforts
- c) Begin public outreach
- d) Schedule Hazard Mitigation Planning Team meeting

5) Questions, Issues or Concerns

AGENDA

Toe River Regional Hazard Mitigation Plan Hazard Mitigation Planning Team Meeting

November 19, 2009

10:00 AM – Noon

1) Introductions

2) Overview of Mitigation/Icebreaker Exercise

3) Project Overview

- a) Key Objectives
- b) Project Tasks
- c) Project Schedule
- d) Project Staffing

4) Data Collection

- a) GIS Data Inventory
- b) Capability Assessment Survey
- c) Public Participation Survey
- d) Existing Mitigation Actions

5) Roles & Responsibilities

- a) PBS&J
- b) County Leads
- c) Participating Jurisdictions

6) Next Steps

- a) Data collection efforts
- b) Begin public outreach
- c) Discuss next Hazard Mitigation Planning Team meeting

7) Questions, Issues or Concerns

AGENDA

Toe River Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team (HMPT) Meeting
February 18, 2010
10:00 AM – Noon

1) Introductions

2) Recap / Status Update

3) Risk Assessment Findings

- a) Hazard Identification & Analysis
- b) Vulnerability Assessment

4) Capability Assessment Findings

5) Public Involvement Activities

- a) Public Participation Survey Update

6) Mitigation Strategy Development

- a) Review of Existing Plan Goals, Objectives and Actions
- b) Mitigation Action Worksheets (Existing Actions)
- c) Identification of New Actions

7) Discussion on Plan Maintenance / Implementation

8) Wrap-up and Next Steps

Toe River Regional Hazard Mitigation Plan
Project Kickoff Meeting

October 29, 2009
10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Bob Boyette	City of Marion	Marion	(828) 652-3551	bboyette@marionnc.org
Wika Elliott	Marion Police Dept.	Marion	828-652-3231	welliott@marionnc.org
Jim Neal	Marion Fire Dept.	Marion	828-652-5201	mfo301@charterinternet.com
Danny McIntosh	Town of Burnsville	Burnsville	828-682-7224	mayer@townofburnsville.org
Nathan Bennett	Yancey County Managers	Burnsville	828-682-3971	Nbennett@yanceycountync.gov
Bill Davis	Yancey County	Burnsville	828-678-9463	bdavis@YANCEYCOUNTYNC.GOV
David Vance	Avery County Emerg. Mgmt.	Newland	828-733-8213	EmergencyManagement@ncma2.l.net
Tommy Burleson	Avery County Planning & Inspections	Newland	828-733-8204	averyplanning@ncma2.l.net

Name	Agency	City	Phone Number	E-mail Address
Mavis Parsley	Mitchell Co Finance Office	Mitchell Co. Bakersville	828 688 2139 x 325	mmparsley@hotmail.com
Richards Carripe	Town Manager	Town of Spruce Pine	828-765-3000	SPMGAR@Ballsouth.net
ERIC WISEMAN	MITCHELL CO. EMERGENCY MANAGEMENT	BAKERSVILLE MITCHELL CO.	828-385-0911	mitem@main.nc.us
Tiawana Ramsey	NCEM	Marshall, NC	828-230-8184	tramsey@ncem.org
TERRY YOUNG	McDowell Co EMA	MARION, NC	828-658-3982	terry.young@mcowell.gov.com

Toe River Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Meeting

November 19, 2009

10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
JAMES SEABERG, GISP	AVERY COUNTY	NEWLAND	828-733-7001	jseaberg@ncmail.net
David Vance	AVERY CO. - Emergency Mgmt.	Newland NC.	828-533-8213	emergency.mgmt@ncmail.net
Brian Buchanan	BURNSVILLE POLICE	BURNSVILLE NC	828 682 4683	BPD@TOWNOFBURNSVILLE.ORG
Isaac McCurry	BURNSVILLE FD	BURNSVILLE NC	828-682-1184	BFD@townofburnsville.org
Bill DAVIS	YANCEY COUNTY EMERGENCY MANAGEMENT	BURNSVILLE NC	828 678 9462	bdaavis@yanceycountync.gov
Nathan Bennett	Yancey County Manager	Burnsville	828/682-3971	Nbennett@yanceycountync.gov
Deborah Godwin	McDowell Tax Office	Moreen	828/652-7121	deborah.godwin@McDowellgov.com
Ronald Harmon	McDowell Planning Admin	Marion	828-652-7121	rharmon@McDowellgov.com

Name	Agency	City	Phone Number	E-mail Address
TERRY YOUNG	McDOWEN CO EM	MARION, NC	828-652-3982	terry.young@mcowell.gov.com
TIAWANNA RAMSEY	NCEM	Marshall, NC	828-230-8184	tramsey@ncem.org
ERIC WISEMAN	MITCHELL CO. EM	BAKERSVILLE	828-688-2139	Mitem@main.nc.us
CHARLES VINES	MITCHELL County MER	BAKERSVILLE	828 688-2139 X-311	MANAGER@MITCHELL.MAN.NC.US
RICHARD CANIBE	Town of Spruce Pine MGR	Spruce Pine	828-765-3000	SPMGR@BeUsouth.net
MAVIS Parsley	Mitchell County Finance	Bakersville	828 688 2139 x 325	mittfin@main.nc.us
Tommy Buckleson	Avery County Planning & Inspection	Newland	828-733-5204	averyoplanning@ncmail.net

Name	Agency	City	Phone Number	E-mail Address
<div>Deborah E. Gubler</div> <div>760.204.2111</div>	<div>Dis McDowell</div>	<div>Waverly</div>	<div>828.652.7124</div>	<div>fd: @ h t</div> <div>deborah.gubler@dis.mcdowell.nc.gov</div>

Name	Agency	City	Phone Number	E-mail Address

PUBLIC NOTICE

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan, titled the *Toe River Regional Hazard Mitigation Plan*, is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks.

Public participation is a valuable component of the planning process and therefore a public meeting will be held on February 18, 2010 at the Avery County Commissioners Board Room (Room 116) located on the second floor of the Avery County Offices Complex Building, 175 Linville Street, Newland, NC 28657 from 6:00 pm to 7:00 pm. Anyone interested in learning more about the *Toe River Regional Hazard Mitigation Plan* and helping us make the community less vulnerable to natural disasters is encouraged to attend.

PUBLIC NOTICE

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan, titled the *Toe River Regional Hazard Mitigation Plan*, is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks.

Public participation is a valuable component of the planning process and therefore a public meeting will be held on February 18, 2010 at the McDowell County Commissioners Board Room located in the County Administration Building, 60 East Court Street, Marion, NC 28752 from 6:00 to 7:00 pm. Anyone interested in learning more about the *Toe River Regional Hazard Mitigation Plan* and helping us make the community less vulnerable to natural disasters is encouraged to attend.

PUBLIC NOTICE

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan, titled the *Toe River Regional Hazard Mitigation Plan*, is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks.

Public participation is a valuable component of the planning process and therefore a public meeting will be held on February 18, 2010 at the Mitchell County Commissioners' Conference Room located in the Mitchell County Administration Building, Bakersville, NC 28705 from 5:30 pm to 6:30 pm. Anyone interested in learning more about the *Toe River Regional Hazard Mitigation Plan* and helping us make the community less vulnerable to natural disasters is encouraged to attend.

PUBLIC NOTICE

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan, titled the *Toe River Regional Hazard Mitigation Plan*, is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks.

Public participation is a valuable component of the planning process and therefore a public meeting will be held on February 18, 2010 at the Yancey County Commissioners Board Room located in the Yancey County Courthouse, Burnsville, NC 28714 from 6:00 pm to 7:00 pm. Anyone interested in learning more about the *Toe River Regional Hazard Mitigation Plan* and helping us make the community less vulnerable to natural disasters is encouraged to attend.